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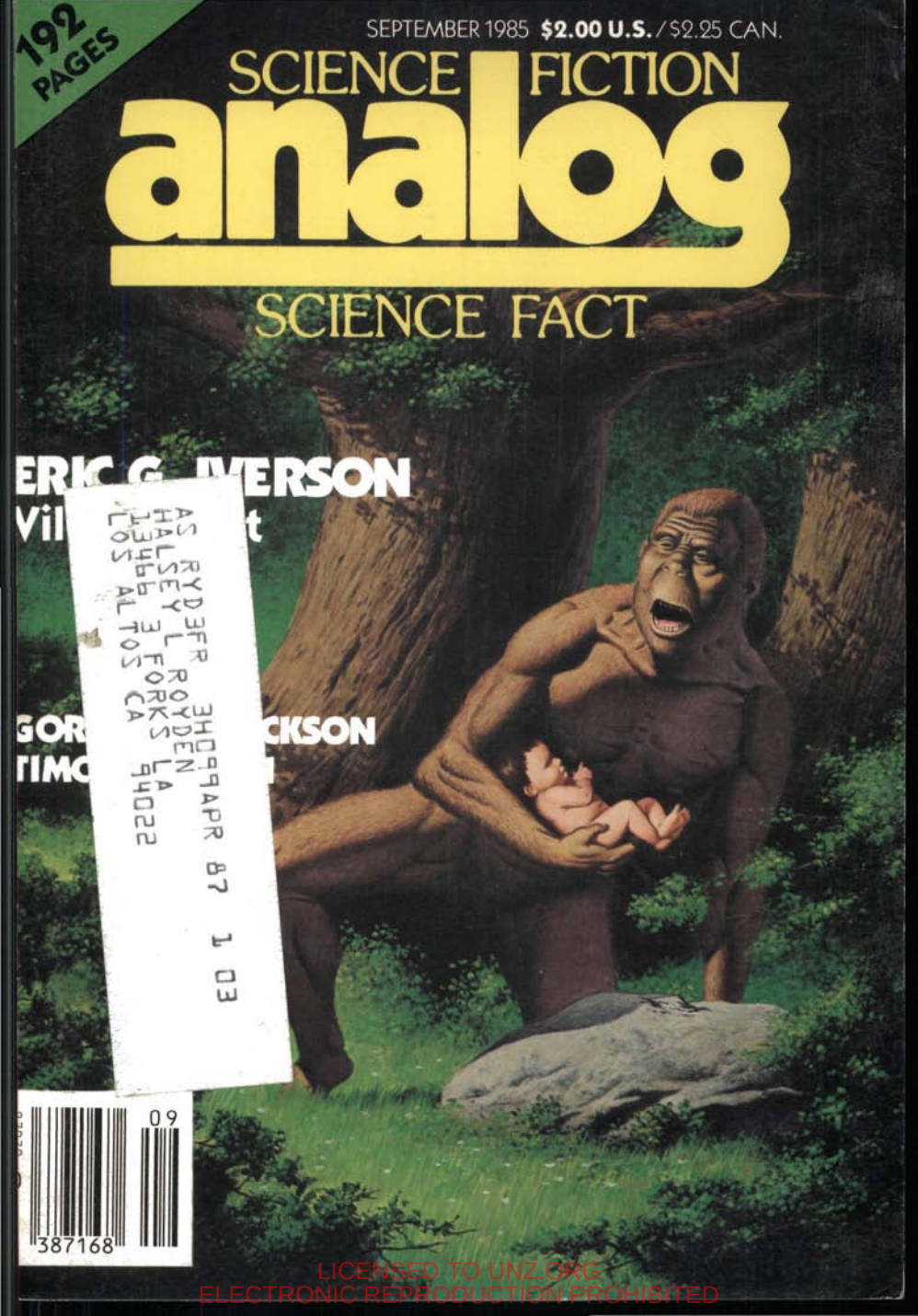

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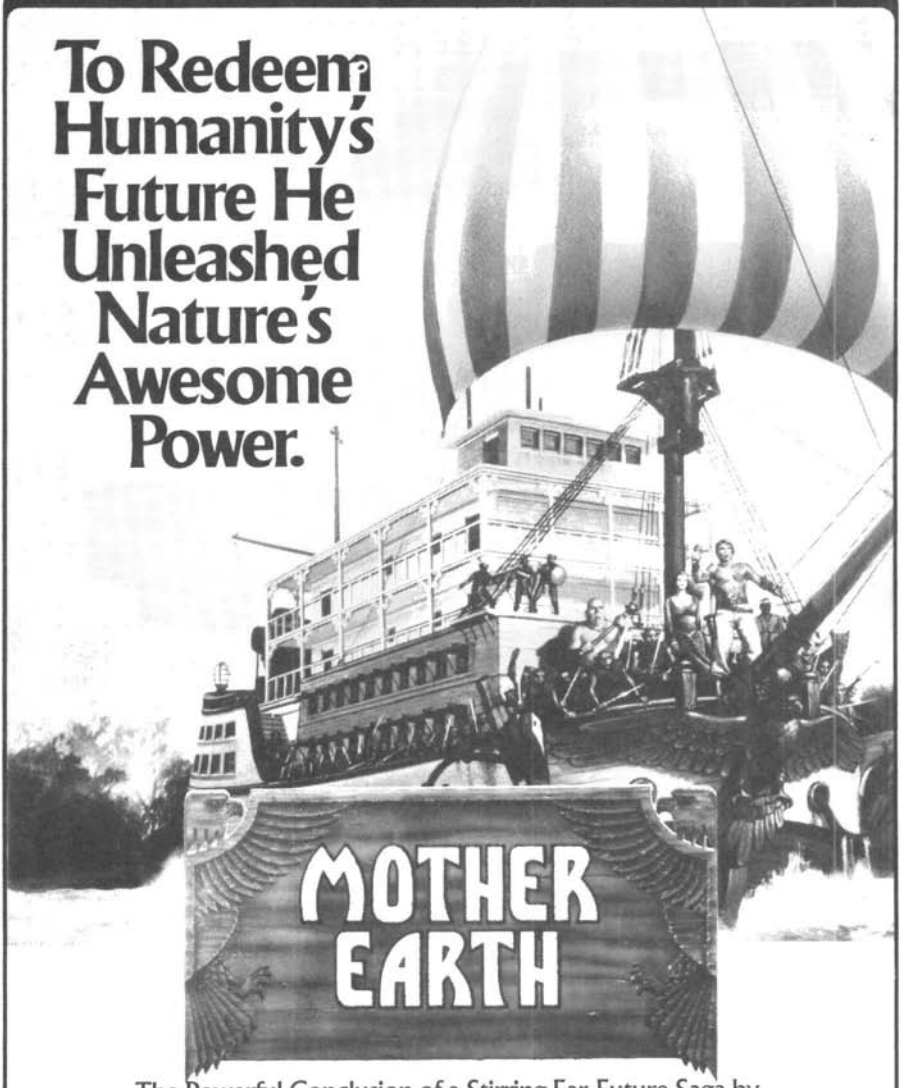

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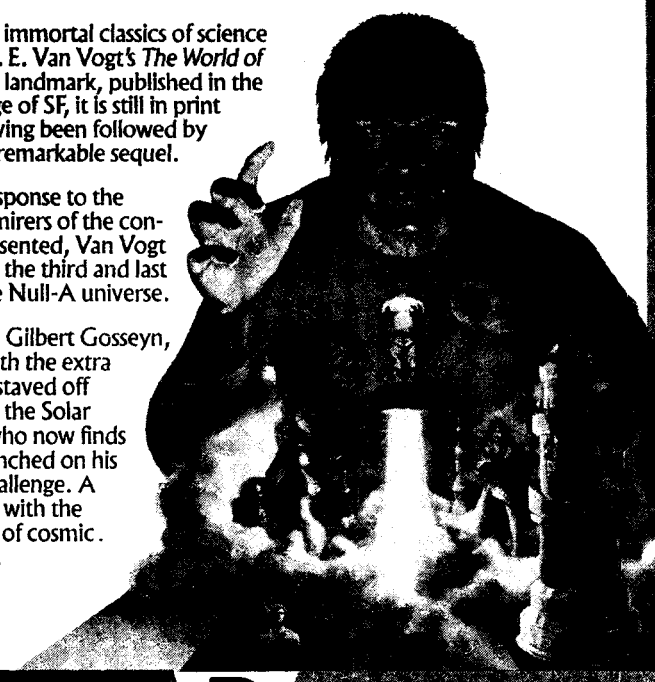

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Editorial

PENDULUMS

Stanley Schmidt

A character of mine once wondered wistfully why rationality in human affairs seemed to exist, when it existed at all, only as a brief transient on the way from one extreme to another. The question was hardly original, but I think it has a rather straightforward answer, and in fact it might be surprising if things were any other way. Almost everybody has used or at least heard the concept of social "pendulum swings," but how many are familiar with just how a physical pendulum works and how closely the "social pendulum" parallels it? The analogy just may be a good deal more rigorous—and instructive—than is commonly realized.

In its simplest form, a pendulum is just a mass hung on the end of a string. Left alone it hangs vertical and motionless. If it is displaced from the vertical, its weight then has a component, called the "restoring force," which pulls it back toward the vertical equilibrium position. But it doesn't stop when it gets there. As long as it is displaced to one side, the restoring force is *accelerating* it toward the equilibrium point. The more it's displaced, the bigger the restoring force, so as it returns to the equilibrium position the force, and hence the acceleration, falls gradually to zero. But the *speed* is still increasing, so the pendulum bob passes through the equilibrium point with a maximum speed and continues to increasing displacements in the opposite direction. Such a displacement again produces a proportional restoring force, which first brings the bob to a halt (just as far on the other side as the point where it started) and then accelerates it back to—and beyond—the equilibrium position. If the pendulum can be protected from all forces except gravity, it will continue to swing indefinitely in this manner between two extreme displacements in opposite directions. It is thus the most familiar and easily demonstrated example of an *oscillator*.

The world is full of oscillators, and the pendulum is actually a somewhat

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special type which may not be the best analog of social fluctuations. A pendulum with small enough oscillations is a close approximation to a *simple harmonic oscillator*, which as a general concept is most commonly depicted as a mass mounted on one end of a spring. The mass is free to slide on a frictionless horizontal track; the other end of the spring is rigidly fixed. The equilibrium position is where the mass sits when the spring is allowed to have its natural length, neither stretched nor compressed. If it is stretched or compressed by a distance x, the spring exerts a restoring force $F = -kx$, pulling back or pushing out toward the equilibrium position. (The minus sign indicates that the force is in the opposite direction from the displacement.) As with the pendulum, the bigger the displacement, the bigger the restoring force. The "spring constant" k is a number describing the strength of the spring: a stiff spring has a high k, meaning it produces a strong restoring force for even a small displacement. Newton established that if *any* force F is applied to a mass m (under "classical" conditions) it produces an acceleration a determined by the equation $F = ma$, or, in the language of calculus,

$$F = m \frac{d^2x}{dt^2}$$

Thus, for the simple harmonic oscillator,

$$F = ma \equiv m \frac{d^2x}{dt^2}$$
$$= -kx.$$

This is a differential equation which can be solved to obtain a mathematical expression describing exactly how displacement x varies with time t. The motion again turns out to be a periodic oscillation between two extremes (each of a magnitude called the *amplitude*) at a well-defined frequency (number of complete oscillations per unit time). The frequency is determined by k and m: a big k (strong spring) accelerates a given mass more rapidly and thus raises the frequency; a big m resists acceleration and thus gives a lower frequency with a given spring.

How a pendulum can be considered a simple harmonic oscillator may not be obvious, since it doesn't contain a spring, the displacement is an angle, and the frequency turns out to depend not on its mass but only on its length. But it can, and that fact provides a good illustration of how useful and widely applicable the harmonic oscillator concept is. If the angular displacement of a pendulum is small enough (i.e., the pendulum is not swinging too wildly), it is for practical purposes proportional to the horizontal *distance* through which the mass is displaced, which we might as well call x. Furthermore, under these conditions the restoring force turns out to be directly proportional to x, so we can set up the differential equation exactly as before. The only difference is that since the restoring force is a component of the pendulum's own weight, the spring constant k is itself proportional to m. Thus m appears on both sides of the equation and cancels out. But the mathematical *form* of the equation remains the same—acceleration

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equals a constant times displacement —and so if you know the solution to one, you can immediately write down the solution to the other, simply by substituting the appropriate constants.

Reasoning by analogy is a notoriously treacherous business, but this kind of *rigorous* analogy is a powerful technique much used in physics. Differential equations of exactly parallel form occur over and over in areas which appear unrelated. For example, an electrical circuit consisting of an inductor and a capacitor is described by an equation exactly like that for a simple harmonic oscillator, with the capacitor "acting like" a spring and the inductor like a mass. And it's only necessary to *solve* the equation once to obtain answers to all these different problems!

And now the social analog. No, I *don't expect to be able to formulate it* as precisely as for an LC circuit, at least now. But there do seem to be correspondences which are at least qualitatively valid, and to my knowledge no one has yet come up with a good reason to assume they *can't* be expressed quantitatively.

A physical object, as most of us were taught way back when, will remain at rest or in motion at constant velocity unless acted on by a force. (Sometimes called "Newton's First Law," this is really just a special case of the second, $F = ma$, with $F = 0$.) So it is with social conditions or trends: they don't change (e.g., fashionable hair lengths stay the same or continue increasing at the current rate) unless some "social force" acts to change them. The bigger the force, the more rapidly it changes things. If you imagine an "equilibrium" state of "moderation" in any measure of social conditions, that state would remain stable as long as nothing happened to produce a disturbance. In practice, a real pendulum in most real-world situations is subject to all kinds of disturbances—wind, jolts from acceleration of a vehicle to which it is attached, vibrations from the footsteps of passing elephants, etc. Similarly, a real society is subject to disturbances such as bad crop years, the introduction of new inventions or ideas, depletion of resources, changes in trade balances, or invasions from neighbors. Any of these influences will initiate a "displacement from equilibrium" in one or more social variables, starting trends toward conservative or liberal spending, higher or lower hemlines, harsher or more lenient punishment for crimes, etc.

Once displaced from "equilibrium," a society, like a pendulum, will experience a restoring force trying to pull it back. The farther it goes toward strong government intervention in private affairs, for example, the stronger will be the reaction from elements who see dangers in that trend and want to reverse it. Eventually that restoring force will halt the trend and start it back, gradually reducing the invasions of privacy. As things get back closer to "moderate," the restoring force, like that on a mechanical oscillator, diminishes—in this case, because when conditions seem less extreme, those who oppose that kind of extremism feel less need to com-

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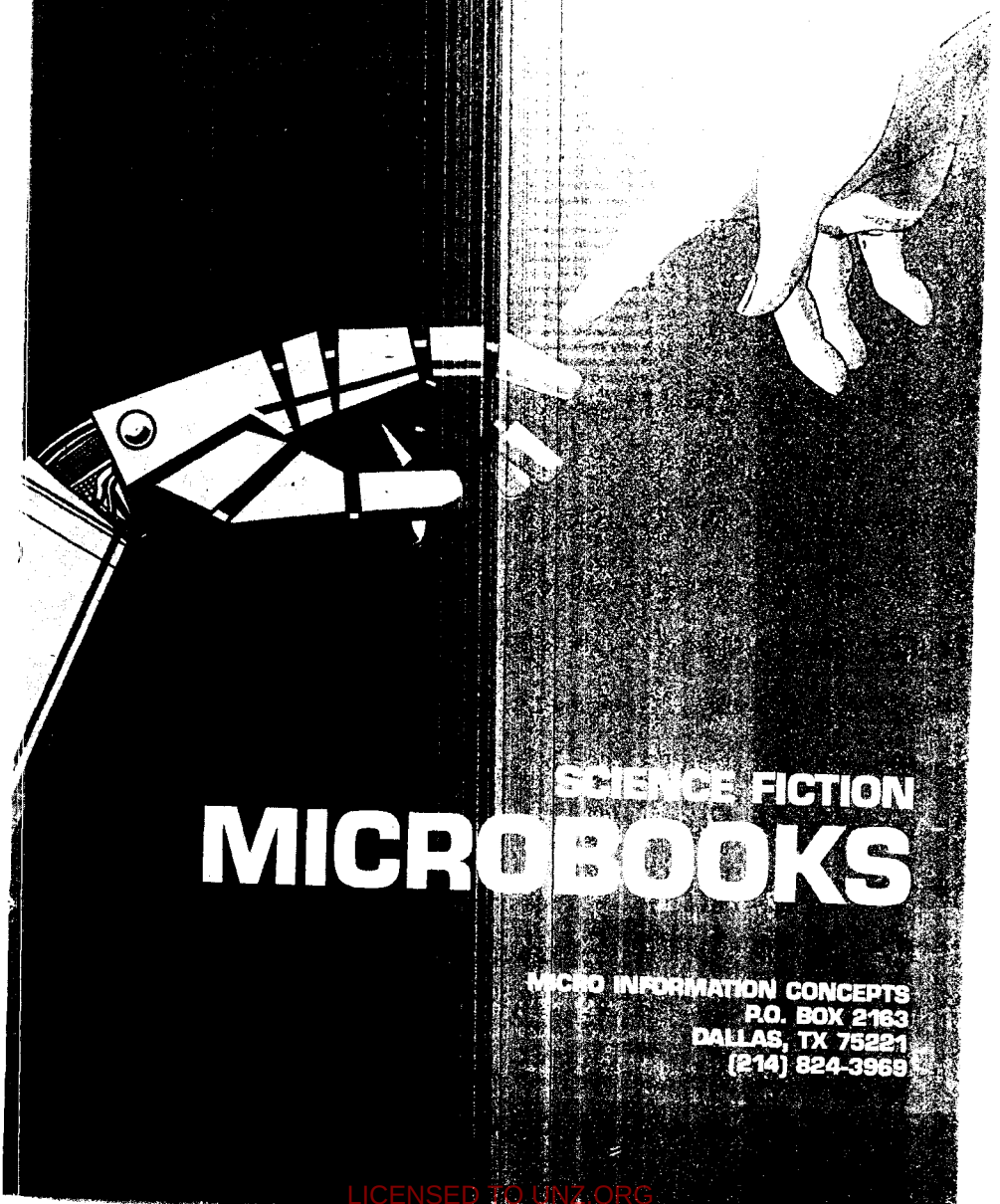

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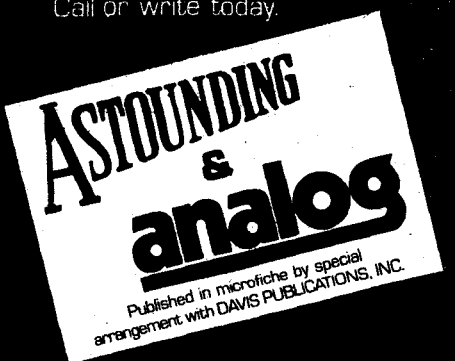

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bat it. But as long as conditions are even slightly on that side of "moderate," there will be some force back toward the "middle." And since motion in that direction is already well established, it won't stop or even slow down until a force is applied in the other direction. As with the physical oscillator, that doesn't happen until it has overshot the equilibrium point. Even then the restoring force is initially small, building up only as more people are more bothered by what they see as extremism of the opposite kind—which in my example might be extreme permissiveness leading to rampant crime. The restoring force eventually halts the swing in that direction, and starts it back. . . .

And so on.

As with a pendulum or a mass on a spring, the process continues, with an amplitude dependent on the magnitude of the disturbance which started the oscillations. If things start out calm and stable, they're not going to start fluctuating wildly unless something very

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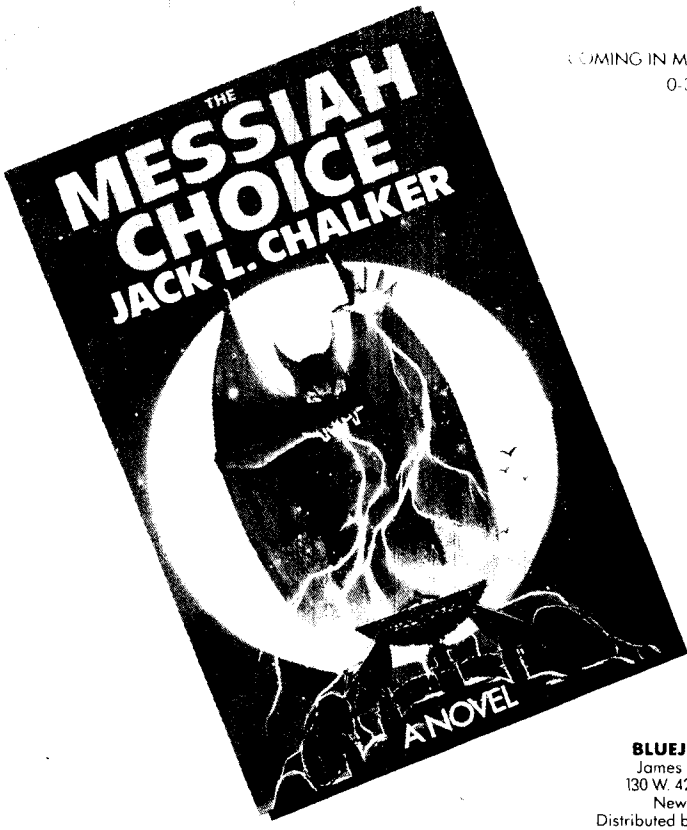

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traumatic happens, like a Viet Nam war. A *really* big force, like the invention of the automobile, may produce not only big oscillations but permanent, nonperiodic changes in the whole basis of society—a social counterpart of moving the entire pendulum assembly to the other side of the room and leaving it there. But even small perturbations will produce oscillations, if only in such trivial matters as the fashionable width of ties. Any displacement will produce a restoring force, and that will eventually lead to an overshoot and a displacement toward the opposite extreme.

With one exception.

There must be something missing from this description, because some periods of history are calmer or more jangled than others—which implies that there is at least one way to reduce the amplitude of oscillations. OK, there is—just as there is for physical oscillators. What it takes is an additional force which starts slowing down the pendulum bob or the oscillating mass *before* it gets back to the equilibrium position. With a pendulum or a mass on a spring such a retarding force, roughly proportional to velocity, is provided by friction in bearings and viscous resistance of the medium (such as air or maple syrup) through which the oscillator moves. The resulting gradual loss of amplitude (and energy) is called *damping*, and it can occur in some form in any oscillating system. In an electrical oscillator damping is provided by resistance. It could be useful to know what sorts of things provide damping of social oscillations, because the amount of damping has a crucial effect on how any oscillating system behaves. With less damping than a certain critical value, overshoots occur and oscillations die down more or less gradually; increase it enough and the system will just come back to equilibrium and stop; increase it still more and it may just "ooze" back toward equilibrium without ever quite getting there. Completely eliminating social oscillations would require the social equivalent of critical damping. How do we get that—and would we want it if we knew how? (Maybe not, but don't answer too quickly. Remember, critically damping oscillations does *not* eliminate the possibility of *all* kinds of motion. Good electrical meters of the analog type are critically damped by design, so that when a current goes through one the needle goes promptly to the appropriate reading and stops, rather than wavering back and forth around it—and when the current is removed, the needle returns in the same way to zero. Such a response pattern, going quickly and smoothly to a state appropriate to the existing conditions, has a lot to recommend it. . . .)

I should probably repeat in closing that I don't claim this analogy is either perfect or complete. Hardly anything about a society is quite as simple as a simple harmonic oscillator, with or without damping. A society is more like a large number of different oscillators, each with its own mass, spring constant, and damping medium, all coupled together by springs of wildly assorted constants; some of the springs are kinked or nonuniform or subject to breakage if

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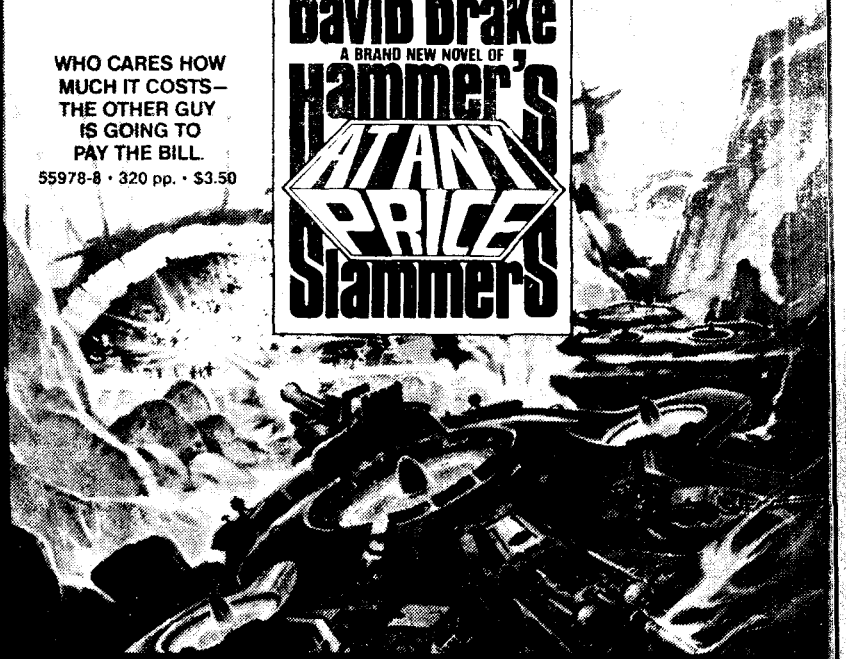

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overstretched; and the whole assemblage is subject to assorted and unpredictable outside forces. But a lot of real physical systems are like that, too. The complications don't invalidate the concept; they just make the details harder to work out. The concept is worth pursuing and developing. Social cycles don't just happen for no cause, but are the direct result of the interaction of social analogs of displacements, restoring forces, masses, and resistive media. Identifying exactly what variables play those roles and how they interact could yield some very useful insights—and who better to do that than some sociologists and historians with a good firm grasp of the kinds of dynamics that keep cropping up in all kinds of physical systems?

Meanwhile, science fiction writers ought to find some interesting ideas to explore in this territory. For example, what is the sociological analog of *resonance*, that ubiquitous phenonemon which makes possible music, radio communication, and the spectacular destruction of bridges like the one that used to span Tacoma Narrows? And what might somebody who understood the answer do with it? ■

● David Hardy has provided one of his colorful and exotic planetscapes for our October cover, to complement Bob Buckley's verbal evocation of the same in his lead story, "World of Crystal, Sky of Fire." Wherever there's a living to be made, human beings will go to scratch one out—especially if there's the slightest promise of not just a living, but a fortune. But potential fortunes tend to be in places where the living is anything but easy. . . .

In lieu of a traditional fact article, we have a unique piece that I can only describe as a "Special Feature," with the somewhat unlikely title, "The Constitutional Origins of *Westly* v. *Simmons*." If your memory is very sharp, you may recognize that as a court case figuring in the background of a very early story by Isaac Asimov, set in an alternate history at about our present time. You've probably read lots of alternate history stories, but probably few which so meticulously traced exactly *how* an alternate present could develop, step by step, from a small change in the past. But then, author Paul Carter is a professional historian with a better than average understanding of good science-fictional thinking.

The October issue will also contain, among other things, a new Haviland Tuf story by George R. R. Martin, and the conclusion of Timothy Zahn's *Spinneret*.

IN TIMES TO COME

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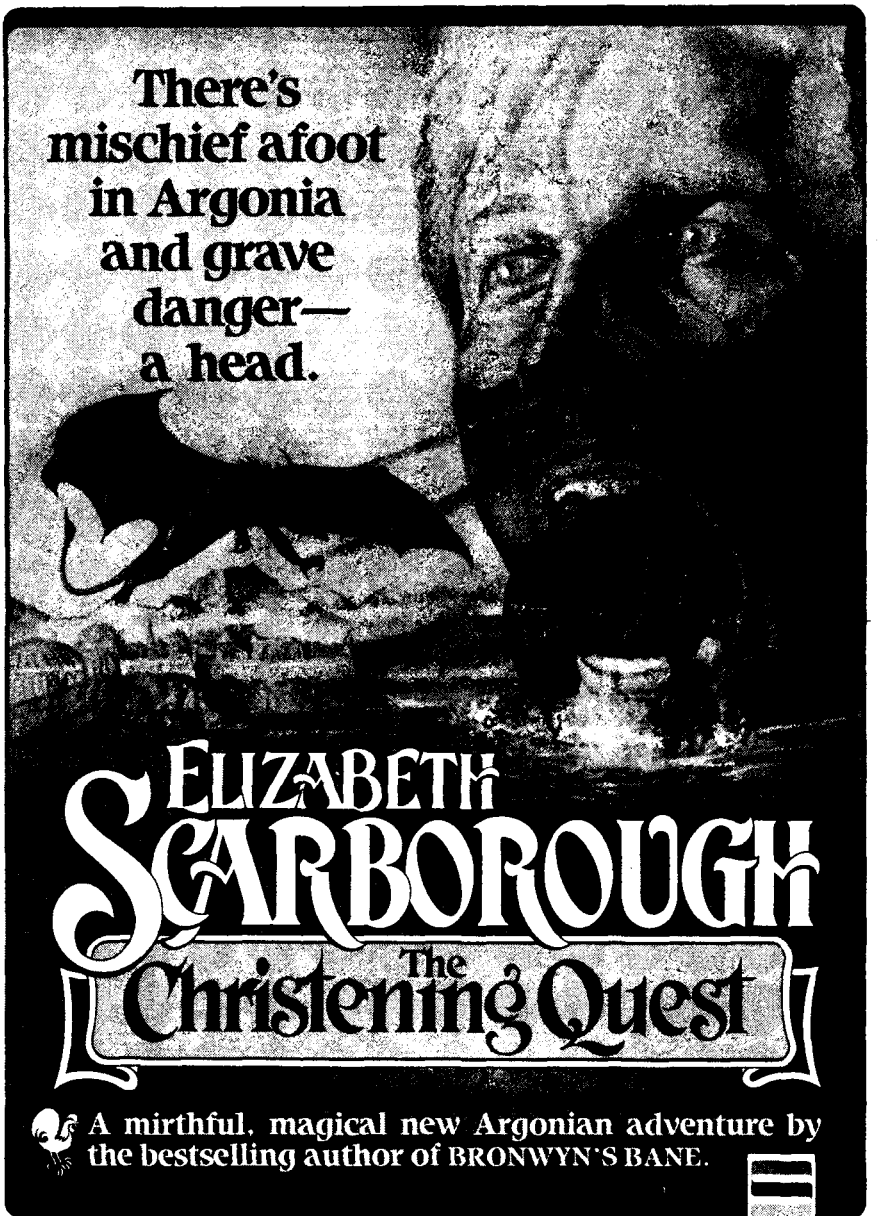
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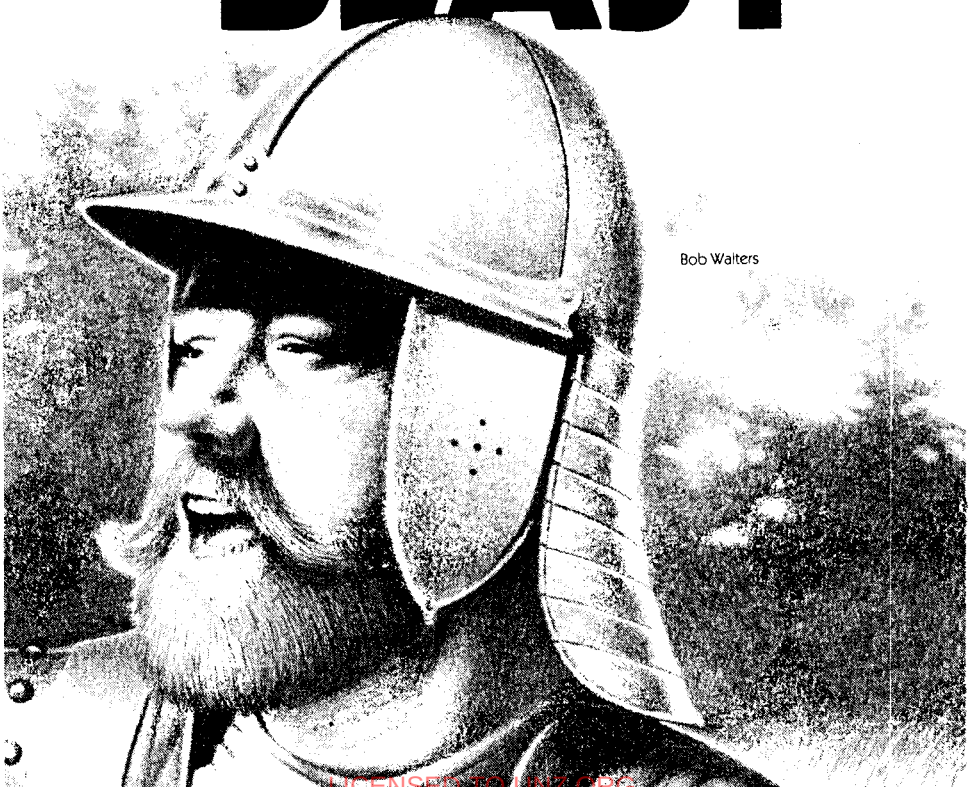
Eric G. Iverson

When Europeans first came to North America, they found the land already occupied. In a slightly altered history, the inhabitants might have been a good deal more ancient—and less clearly human—than the ones they found.

VILEST BEAST



Bob Walters

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Simia quam similis, turpissima bestia, nobis! (The ape, vilest beast, how like us!)

Ennius, quoted in Cicero
De natura deorum

After thirty mild English summers, July in Virginia smote Edward Wingfield like a blast from hell. Sweat poured off him as he tramped through the forest a few miles from Jamestown in search of game. It clung, greasily, in the humid heat.

He held his crossbow cocked and ready. He also carried a loaded pistol in each boot, but the crossbow was accurate at longer range, silent, and wasted no precious powder. The guns were only for emergencies.

Wingfield studied the dappled shadows. A little past noon, he guessed. Before long he would have to turn round and head home for the colony. He had had a fairly good day: two rabbits, several small birds, and a fat gray squirrel hung from his belt.

He looked forward to fall and the harvest. If all went well this year, the colony would finally have enough wheat for bread and porridge and ale. How he wished—how all Europeans wished—this godforsaken new world offered wheat or barley or even oats of its own. But it did not, so all seed grain had to cross the Atlantic. Jamestown had lived mostly on game and roots for three years now. Lean and leathery, Wingfield had forgotten what a hot, fresh loaf tasted like. He only remembered it was wonderful.

Something stirred in the undergrowth ahead. He froze. The motion came again. He spied a fine plump rabbit, its beady black eyes alert, its ears cocked for danger.

Moving slowly and steadily, hardly breathing, he raised the crossbow to his shoulder, aimed down the bolt. Once the rabbit looked toward him. He stopped

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moving again until it turned its head away.

He pressed the trigger. The bolt darted away, slammed into a treetrunk a finger's breadth above the rabbit's ear. The beast bounded away.

"Hellfire!" Wingfield dashed after it, yanking out one of his pistols.

He almost tripped over the outflung branch of a grapevine. The vine's main stock was big around as his calf. Virginia grapes, and the rough wine the colonists made from them, were some of the few things that helped keep Jamestown bearable.

The panic-stricken rabbit, instead of diving in to the bushes for cover and losing itself there, burst past a screen of brush into a clearing. "Your last mistake, beast!" Wingfield cried in triumph. He crashed through the brush himself, swinging up the gun as he did so.

By then the rabbit was almost to the other side of the clearing. He saw it thrashing in the grass there. Wingfield paused, puzzled: had a ferret torn out its throat as it scampered along, oblivious to everything but its pursuer? Then his grip tightened on the trigger, for a sim emerged from a thicket and ran toward the rabbit.

It had not seen him. It bent down by the writhing beast, smashed in the rabbit's head with a rock. Undoubtedly it had used another to bring the animal down; sims were deadly accurate throwing sharpened stones.

Wingfield stepped into the clearing. The colony was too hungry to let any food go.

The sim heard him. It rose, clutching the bloody rock in a large, knobby-knuckled hand. It was about as tall as the Englishman, and naked but for its own abundant hair. Its long, chinless jaw opened to let out a hoot of dismay.

Wingfield gestured with the pistol. Sims had no foreheads to speak of above their bone-ridged brows, but they had learned the colonists' weapons slew at a distance greater than they could cast their rocks. Usually, these days, they retreated instead of proving the lesson over again.

This one, though, stood its ground, baring broad, yellow teeth in a threatening grimace. Wingfield gestured again, more sharply, and hoped he seemed more confident than he felt. If his first shot missed, or even wounded but failed to kill, he would have to grab for his other gun while the sim charged—and pistol-range was not *that* much more than a stone's throw.

Then the bushes quivered on the far side of the clearing, and a second sim came out to stand behind its fellow. This one carried a large, sharp-edged rock ready to hurl. It shook its other fist at Wingfield, and shouted angrily.

It was the Englishman's turn to grind his teeth. If both sims rushed him, he would never have the chance to reload either a pistol or his crossbow. The odds of stopping them with just two shots were not worth betting his life on, not for a rabbit. And if they did kill him, they would not content themselves with the game he carried. They would eat him too.

Raising the pistol in a final warning, he drew back into the woods. The sims' mocking cries followed him. He hated the filthy animals . . . if they were animals. Close to a century had passed

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since the Spaniards brought the first pair back to Cadiz from their coastal fortress of Veracruz. Churchmen and scholars were still arguing furiously over whether sims were mere brute beasts or human beings.

At the moment, Wingfield was ready to hate them no matter what they were.

He found the tree where he had shot at the rabbit the sims were now doubtless gulping down raw. He managed to cut himself while he was digging out the crossbow bolt with his knife. That did nothing to improve his temper. Had he shot straight in the first place, he would not have put himself in the humiliating position of backing away from sims.

Thinking such dark thoughts, he turned back toward Jamestown. He scratched at his nose as he walked along, and felt skin peel under his nails. One more annoyance—he was too fair not to burn in this climate, but found wearing a hat equally intolerable.

On his way home, he knocked over a couple of quail and one of the native beasts that looked like giant, white-faced rats but tasted much better. That improved his mood, a little. He was still grumbling when Allan Cooper hailed him from the edge of the cleared ground.

Thinking of the guard's misery made him ashamed of his own bad temper. Cooper wore a gleaming back-and-breast with thick padding beneath; a heavy plumed morion sat on his head. In that armor, he had to be steaming like a lobster boiled in its own shell. Yet he managed a cheery wave for Wingfield. "Good bag you have there," he called.

"It should be better, by one hare," Wingfield replied, pique flaring again. He explained how he had lost the beast to the sims.

"Aye, well, no help for such things sometimes, not two on one," Cooper sighed, and Wingfield felt relief at having a professional soldier sustain his judgment. The guard went on, "The thieving devils are robbing traps again, too. Henry Dale came in empty handed this afternoon, swearing foul enough to damn himself on the spot."

"If swearing damns a man, Henry was smelling brimstone long years ere this," Wingfield observed.

Cooper laughed. "You speak naught but the truth there, though I don't blame him for his fury this time. Sims are worse than foxes ever were—foxes have no hands." He hefted his matchlock musket. "Without guns, we'd never keep them from our own animals. And how often have they raided the henhouse?"

"Too many times." Wingfield turned to a less gloomy subject. "How is Cecil?"

"Doing splendidly," Cooper said, his voice full of pride. "The lad will be three months tomorrow." Cecil Cooper was Jamestown's oldest child; the first ship carrying women had reached Virginia only a year before. Wingfield had a daughter, Joanna, only a few weeks younger than the guard's son.

He left Cooper and walked down the muddy path through the fields. Several rows of thatch-roofed cabins stood by the log stockade that mounted cannon. On the other side of the fortress were longer rows, of graves. More than half of the original three shiploads of colonists had died from starvation or disease. A couple of the newest burials

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were pathetically small: even back in England, so many infants did not live to grow up, and life was far harsher here.

But the marker that grieved Wingfield most was one of the oldest, the one showing where captain John Smith lay. Smith had been a leader Jamestown could have followed without hesitation. Always eager to explore, he had set about learning the countryside from the day the English landed—until the sims killed him, three months later. Without him, the settlement seemed to have a lesser sense of drive, of purpose.

Still, it went on, as men and their works do. Several colonists swung the gates of the fortress open so others could drive in the pigs, goats, and oxen for the night to protect them from the sims and other predators. The pigs and goats, which ate anything they came across, thrived in this new land. The oxen had the same gaunt look as most of the colonists.

Wingfield's cabin was in the outer row, closest to the forest. Smoke rose from the chimney as he approached. The door stood open to let in what air would come.

Hearing her husband's step, Anne Wingfield came out to greet him. He hugged her close, so glad she had chosen to spend her life with him. She had had her pick of suitors, as was true of all the women in Virginia—men outnumbered them four to one.

She exclaimed in pleasure at how much game he had brought home. Back in London, she would have been nothing special to look at: a rather husky, dark-haired girl in her early twenties, with strong features—if anything, handsome rather than pretty. On this side of the Atlantic, though, she was by definition a beauty.

"And how is Joanna?" Wingfield asked as his wife skinned and disjointed his two rabbits and tossed the meat into the stewpot. The rabbits shared it with a small piece of stale venison from a couple of days before and a mess of wild onions, beechnuts, mushrooms, and roots. The smell was heavenly.

"Asleep now," Anne said, nodding toward the cradle, "but very well. She smiled at me again this morning."

"Maybe next time she will do it in the night, so I may see it too."

"I hope she will."

While they waited for the rabbits to cook, they dealt with the rest of Wingfield's catch, cutting the meat into thin strips and setting them on racks over the fire to dry and smoke. After what seemed an eternity, Anne ladeled the stew into wooden bowls. Wingfield licked his clean. Though matters were not so grim as they had been the first couple of dreadful winters, he was always hungry.

"I would have had another cony, but for the sims," he said, and told Anne of the confrontation.

Her hand jumped to her mouth. "Those horrid beasts! They should all be hunted down and slain ere they harm any more of our good Englishmen. What would I have done here, alone save only for Joanna, had they hurt you?"

"No need to fret over might-have-beens; I'm here and hale," he reassured her, and got up and embraced her for good measure. "As for the sims, if they be men, slaying them out of hand so

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would burden us with a great weight of sin when we are called to the Almighty."

"They are no creatures of His," Anne returned, "but rather of the Devil, the best he could do toward making true humankind."

"I've heard that argument before. To me it smacks of the Manichaean heresy. Only God has the power to create, not Satan."

"Then why did He shape such vile parodies of ourselves, His finest creatures? The sims know nothing of farming or weaving or any useful art. They cannot even set fires to cook the beasts they run down like dogs."

"But they know fire, though I grant they cannot make it. Yet whenever lightning sets a blaze, some sim will play Prometheus and seize a burning brand. They keep the flames alive long as they may, till they lose them from rain or sheer fecklessness."

Anne set hands on hips, gave Wingfield a dangerous look. "When last we hashed this over, as I recollect, 'twas you who reckoned the sims animals and I the contrary. Why this reversal?"

"Why yours, save your concern for me?" he came back. "I thank you for't, but the topic's fit to take from either side. I tell you frankly, I cannot riddle it out in certain, but am changeable as a weathervane, ever thinking now one thing, now the other."

"And I, and everyone," Anne sighed. "But if they put you in danger, my heart cannot believe them true men, no matter what my head might say."

He reached out to set his fingers gently on her arm. The tender gesture was spoiled when a mosquito spiraled down to land on the back of his hand. The swamps round Jamestown bred them in throngs worse than any he had known in England. He swatted at the bug, but it flew off before the deathblow landed.

Outside, someone struck up a tune on the mandolin, and someone else joined in with a drum. Voice soared in song. The settlers had only the amusements they could make for themselves. Wingfield looked out, saw a torchlit circle dance forming. He bobbed his head toward his wife. "Would it please you to join them?"

"Another time," she said. "Joanna will be waking soon, and hungry. We could step outside and watch, though." Wingfield agreed at once. Any excuse to get out of the hot, smelly cabin was a good one.

Suitors were buzzing as avidly as the mosquitoes round the few young women who had not yet chosen husbands. Some of those maids owned distinctly fragile reputations. With no others to choose from this side of the sea, they were courted nonetheless.

"Oh, my dear, what would you have me do?" cried a roguish youngster named Caleb Lucas to a girl who, smiling, had turned her back on him. "Go off to the woods and marry a sim?" Laughter rose, hearty from the men who heard him, half-horrified squeals from the women.

"Allan Cooper says the Spaniards do that, or anyway cohabit," Wingfield told Anne. Spain held a string of outposts down to Magellan's strait and then up the western coast of South America, to serve her galleons plying the rich trade with the Indies.

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"Have they not read Deuteronomy?" Anne exclaimed, her lip curling in disgust. Then curiosity got the better of her and she whispered, "Can there be issue from such unions?"

"In truth, I don't know. As Allan say, who's to tell the difference betwixt the get of a Spanish sire and that of a sim?" Anne blinked, then burst into giggles at the bawdy slander against England's longtime foe.

Before long, both she and her husband were yawning. The unremitting labor of building the colony left scant energy for leisure or anything else. Still, Wingfield hesitated before he blew out the last lamp in the cabin. He glanced toward Anne, and saw an answering flush rise from the throat to her cheeks. She was recovered now from the ordeal of childbirth. Perhaps tonight they might start a son. . . .

He was about to take Anne in his arms when Joanna let out a yowl. He stopped short. His wife started to laugh. She bared a breast. "Let me feed her quickly, and put her back to sleep. They, why, we shall see what we shall see."

"Indeed we shall." Wingfield lay down on the lumpy, straw-stuffed bed to wait. He knew at once he had made a mistake, but fell asleep before he could do anything about it.

Anne stuck out her tongue at him when the sun woke him the next morning. She skipped back when he reached for her. "This even," she promised. "We have too much to do of the day to waste it lying abed."

He grimaced. "You have a hateful way of being right." He scrambled into trousers and boots, set a plumed hat on

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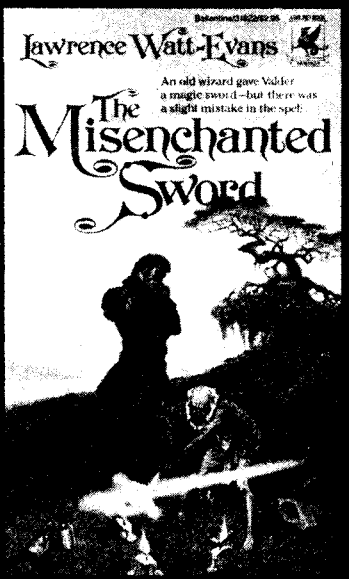
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his head to shield him from the sun. The plume was a bright pheasant's feather from England, now sadly battered. Soon he would have to replace it with a duller turkey tailfeather.

He was finishing a bowl of last night's stew, strong but still edible, when someone knocked on the cabin door. "There, you see?" Anne said.

"Hush."

He opened the door. Henry Dale came in. He was a short, fussy man whose ruddy complexion and tightly held jaw gave clues to his temper. After dipping his head to Anne, he said, "Edward, what say we set a few snares today, mayhap if fortune favors us in spots where no knavish sims will come on them to go a-poaching."

"Good enough. Allan Cooper told me how you were robbed yesterday."

Anne's presence plainly was the only thing keeping Dale from exploding with fury. He limited himself to a single, strangled, "Aye." After a few moments, he went on, "Shall we be about it, then?"

Wingfield checked his pistols, tucked a bundle of crossbow bolts into his belt-pouch, nodded. After a too-brief embrace with his wife, he followed Dale out into the bright morning.

Men were already weeding, hoeing, watering in the fields. Caleb Lucas shooed a goat away from the fresh, green stalks of wheat, speeding it on with a kick that brought an indignant bleat from the beast. "And the very same to you," Lucas called after it. "Damned impudent beast, you can find victuals anywhere, so why thieve your betters' meals?"

"Belike the foolish creature thinks itself a sim," Dale grunted, watching the goat scurry for the edge of the woods, where it began browsing on shoots. "It lacks the accursed losels' effrontery, though, for it will not turn on its natural masters. The sims, now, those whoreson, beetle-headed, flap-ear'd stinkards—"

Without pausing but to draw breath, he continued in that vein until he and Wingfield were surrounded by forest. As had Anne's remarks the night before, his diatribe roused Wingfield's contentious nature.

"Were they such base animals as you claim," he said, "the sims would long since have exterminated one another, and not been here for us to find on our landing."

Dale gave him a look filled with dislike. "For all we know, they well-nigh did. 'Twas not on us they began their habits anthropophagous."

"If they were eating each other, Henry, and you style them 'anthropophagous,' does that not make men of them?" Wingfield asked mildly. His companion spluttered and turned even redder than usual.

A robin twittered among the leaves. So the colonists named the bird, at any rate, but it was not the redbreast of England. It was big and fat and stupid, its underparts the color of brick, not fire. It was, however, easy to kill, and quite tasty.

There were other sounds in the woods, too. Somewhere, far off, Wingfield heard the deep-throated barking cries of the sims. So did Henry Dale. He spat, deliberately, between his feet. "What men speak so?" he demanded. "Even captured and tamed—as much as one

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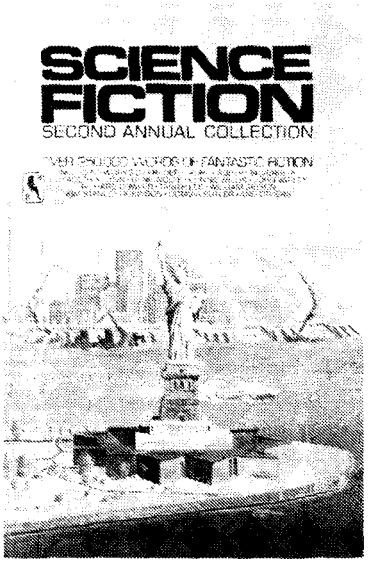

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may tame the beasts—they do but point and gape and make dumb show, as a horse will, seeking to be led to manger."

"Those calls have meaning to them," Wingfield said.

"Oh, aye, belike. A wolf in a trap will howl so piteously he frightens his fellows away. Has he then a language?"

Having no good answer to that, Wingfield prudently kept silent.

As the two men walked, they looked for signs to betray the presence of small game. Dale, who was an able woodsman when amiable, spotted the fresh droppings that told of a woodchuck run. "A good place for a snare," he said.

But even as he was preparing to cut a noose, his comrade found a track in the soft ground to the side of the run: the mark of a large, bare foot. "Leave be, Henry," he advised. "The sims have been here before us."

"What's that you say?" Dale came over to look at the footprint. One of the settlers might have made it, but they habitually went shod. With a disgusted grunt, Dale stowed away the twine. "Rot the bleeding blackguards! I'd wish their louse-ridden souls to hell, did I think God granted them any."

"The Spaniards baptize them, 'tis said."

"Good on them!" Dale said, which startled Wingfield until he continued, "A papist baptism, by Jesus, is the most certainest highroad to hell of any I know."

They walked on. Wingfield munched on late-ripening wild strawberries, larger and sweeter than any that grew in England. He spotted a woodchuck ambling from tussock to tussock. This time he aimed with special care, and his shot knocked the beast over. Dale grunted again, now in approval. He had bagged nothing more than a couple of songbirds.

They did find places to set several new snares: simple drag nooses, hanging snares made from slip nooses fastened to the ends of saplings, and fixed snares set near bushes. The latter were especially good for catching rabbits.

They also visited the snares already set. A horrible stench announced that one of those had taken a black-and-white New World polecat. Skinned and butchered to remove the scent glands, the beast made good eating. Wingfield and Dale tossed a copper penny to see who would have to carry it home. Wingfield lost.

Two traps had been sprung but held no game. There were fresh sim footprints around both. Dale's remarks were colorful and inventive.

The Englishmen headed back toward Jamestown not long after the sun began to wester. They took a route different from the one they had used on the way out: several traps remained to be checked.

A small, brown-and-white striped ground squirrel scurried away from Wingfield's boot. It darted into a clump of cockleburs. A moment later, both hunters leaped back in surprise as the little animal was flung head-high, kicking in a noose, when a bent sapling suddenly sprang erect.

"Marry!" Dale said. "I don't recall setting a snare there."

"Perhaps it was someone else. At all odds, good luck we happened along now." Wingfield walked over to retrieve the ground squirrel, which now

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hung limp. He frowned as he undid the noose from around its neck. "Who uses sinew for his traps?"

"No one I know," Dale said. "Twine is far easier to work with."

"Hmm." Wingfield was examining the way the sinew was bound to the top of the sapling. It had not been tied at all, only wrapped around and around several twigs until firmly in place. "Have a look at this, will you, Henry?"

Dale looked, grunted, turned away. Wingfield's voice pursued him: "What animals make traps, Henry?"

"Aye, well, this is the first we've seen, not so, in all the time we've been this side of the Atlantic. I take that to mean the sims but ape us, as a jackdaw will human speech, without having the divine spark of wit to devise any such thing for themselves. Damn and blast, man, if a dog learns to walk upon his hinder feet, is he then deserving of a seat in Parliament?"

"More than some who have them now," Wingfield observed.

Both men laughed. Dale reached for the ground squirrel, tossed it into the bag with the rest of the game he carried. His crooked teeth flashed in a rare grin. "It does my heart good to rob the vermin this once, instead of the other way round."

His good humor vanished when he and Wingfield returned to the settlement. They found not only Allan Cooper and the three usual guards armed and armored, but also a double handful more men. That morning a sim had burst out of the woods, smashed in a goat's skull with a rock, flung the animal under an arm, and escaped before the startled Englishmen could do anything.

"I shot, but I missed," Cooper said morosely.

"It's a poor trade for a ground squirrel, Henry," Wingfield remarked.

His hunting partner's scowl was midnight-black. "The mangy pests grow too bold! Just the other night they slaughtered a hound outside the stockade, hacked it to pieces with their stones, and were eating the flesh raw when at last the sentry came round with his torch and spied them. He missed, too," Dale finished, with a sidelong look at Cooper.

"And would you care to draw conclusions from that?" the guard asked. His hand caressed the hilt of his rapier.

Henry Dale hesitated. As a gentleman, he was trained to the sword. But liverish temper or no, he was not a fool; Cooper had learned in a harsher school than his, and survived. At last Dale said, "I draw the same conclusions as would any man of sense: that our best course is to rid ourselves of these pestiferous sims forthwith, as wolves and other vicious creatures have long been hunted out of England."

"I hold to war, Henry, on being attacked, but not to murder," Cooper said. "Mind, we must seem as outlandish to them as they to us."

"Killing a sim is no more murder than butchering a pig," Dale retorted. The endless debate started up again.

Having no desire to join in or listen to another round, Wingfield took his share of the game back to his cabin. Anne was changing Joanna's soiled linen. She looked up with a wan smile. "There's no end to't."

The baby kicked her legs and smiled

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toothlessly at her father. He felt his own tight expression soften.

He plucked the songbirds, skinned the polecat, set the hide aside to be tanned. He gutted the birds and tossed their little naked bodies into the stewpot whole. He threw the offal outside for the pigs or dogs to find. The black-and-white polecat required more skillful butchery, for it had to be cut into pieces after the scent glands were removed.

"Thank you, dear." Anne rocked Joanna in her arms. "She's getting hungry—aren't you, sweet one? What say I feed you now, so you let us eat in peace afterwards. Can you tend to the stew, Edward?"

"Of course." He stirred the bubbling contents of the pot with a wooden spoon. Now and again he tossed in a dash of dried, powdered herbs or a pinch of grayish sea-salt.

Joanna nursed lustily, then fell asleep. The stew began to smell savory. Anne was about to ladle it into bowls when the baby wet herself and started crying again. Her mother gave Wingfield a look of mingled amusement and despair.

"Go on with what you were about," he told her. "I'll tend to Joanna." Anne sighed gratefully. Wingfield tossed the soggy linen into the pile with the rest for tomorrow's washing. He found a dry cloth, wrapped the baby's loins, and set her in her cradle. Anne rocked it while they ate.

Joanna tolerated not being held, but showed no interest in going back to sleep. She squawked indignantly when Anne made the mistake of trying to turn her onto her belly, and remained irritated enough to stay awake even after her mother picked her up.

Her fussy cries rang loud in the small cabin. After a while, Wingfield thrust a torch in the fire. "Let's walk her about outside," he suggested. "That often seems to calm her."

Anne agreed at once. She rocked the baby in her arms while her husband held the torch high so they would not stumble in the darkness. With his free hand, he batted at the insects the torch drew.

The James river splashed against the low, swampy peninsula on which Jamestown sat, and murmured as it flowed by unimpeded to the south. Above it, on this clear, moonless night, the Milky Way glowed like pale mist among the stars of the Scorpion and the Archer. Elsewhere, but for silver points, the sky was black.

Even blacker against it loomed the forest to the north. Suddenly Wingfield felt how tiny was the circle of light his torch cast: as tiny as the mark the English had yet made on this vast new land. The comparison disturbed him.

From the edge of the forest came the cries of sims, calling back and forth. Wingfield wondered how much meaning lay behind them. Those bestial ululations could hardly be true speech —Henry Dale was right there—but they were much more varied, more complex, than a wolfpack's howls.

Anne shivered, though the night was warm. "Let us go back. I take fright, hearing them so close."

"I mislike it also," Wingfield said, turning round. "We are not yet here in numbers enough to keep them from drawing nigh as they wish. Be glad, though, you were still in dear England

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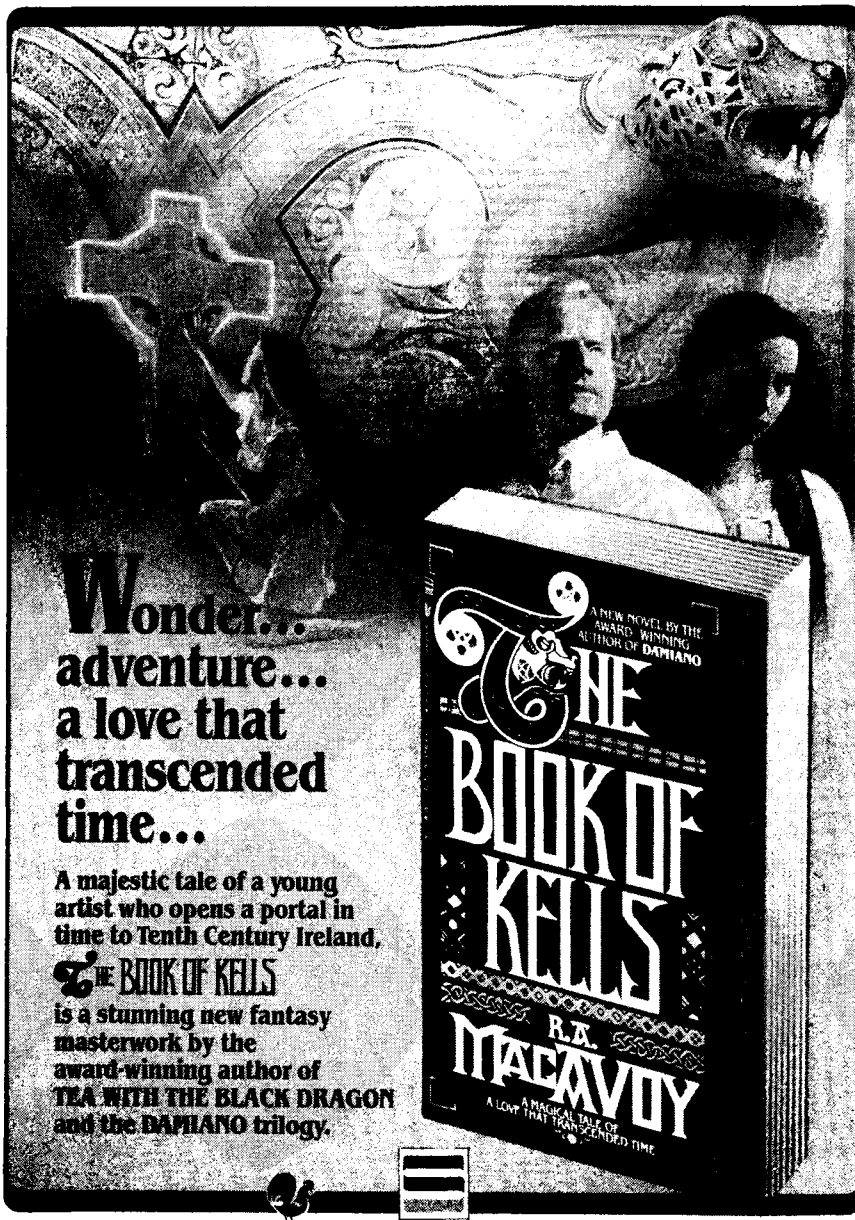
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those first two years, when they thought us and ours some new sorts of prey for their hunting." He touched the knife on his belt. "We've taught them better than that, at any rate."

"I've heard the tales," Anne said quietly.

Wingfield nodded. As was the way of things, though, not all the tales got told. He had been one of the men who brought John Smith's body back for burial. He knew how little of it rested under its stone, awaiting the resurrection.

To his mind, the sims' man-eating habits gave strong cause to doubt they had souls. If one man devoured another's flesh, to whose body would that flesh return come the day of judgment? As far as he knew, no learned divine had yet solved that riddle.

Such profitless musings occupied him on the way back to the cabin. Once inside, Anne set Joanna back in the cradle. The baby sighed but stayed asleep; she probably would not rouse till the small hours of the morning.

The embers in the fireplace cast a dying red glow over the single room. Wingfield stripped off his clothes; in the sultry Virginia summer, nightwear was a positive nuisance.

Anne lay down beside him. He stroked her smooth shoulder. She turned toward him. Her eyes were enormous in the dim light. "Here it is, evening," he said, at the same time as she was whispering, "This even, is it not?" They laughed until he silenced her with a kiss.

Afterwards, he felt his heart slow as he drifted toward slumber. He was hotter than he had been before, and did not mind at all; the warmth of the body was very different from that of the weather. He did not know why that was so, but it was. Anne was already breathing deeply and smoothly. He gave up thought and joined her.

He was never sure what exactly woke him, some hours later; he usually slept like a log till morning. Even Joanna's cries would not stir him, though Anne came out of bed at once for them. And this noise was far softer than any the baby made.

Maybe what roused him was the breeze from the open cabin door. His eyes opened. His hand went for his knife even before he consciously saw the two figures silhouetted in the doorway. *Thieves,* was his first thought. The colonists had so few goods from England that theft was always a problem, the threat of the whipping-post notwithstanding.

Then the breeze brought him the smell of the invaders. The Englishmen bathed but seldom; they were often rank. But this was a thicker, almost cloying stench, as if skin and water had never made acquaintance. And the shape of those heads outlined against the night—

Ice ran through Wingfield. "Sims!" he cried, bounding to his feet.

Anne screamed. The sims shouted. One sprang at Wingfield. He saw its arm go back, as if to stab, and knew it must have one of its sharpened stones to hand. That could let out a life as easily as his own dagger.

He knocked the stroke aside with his left forearm, and felt his hand go numb; the sims were devilish strong. He thrust himself. He felt his blade bite flesh. The sim yammered. But the wound was not

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mortal. The sim grappled with him. They rolled over and over on the dirt floor, each grabbing for the other's weapon and using every fighting trick he knew. The sim may have had less skill than Wingfield, but was physically powerful enough to make up for it.

A tiny corner of Wingfield's awareness noticed the other sim scuttling toward the hearth. He heard Anne shriek, "Mother Mary, the baby!" Bold as a tigress, she leapt at the sim. Her hands clawed, but it stretched her senseless with a backhand blow.

At almost the same moment, the sim Wingfield was battling tore its right arm free from the weakened grasp of his left. He could not ward off the blow it aimed, but partially deflected it, so that the flat front of the stone, rather than the edge, met his forehead. The world flared for a moment, then grayed over.

He could not have been unconscious long. He was already aware of himself, and of the pounding anguish in his head, when someone forced a brandy bottle into his mouth. He choked and sputtered, spraying out most of the fiery liquid.

He tried to sit; hands supported his back and shoulders. He could not understand why the torch Caleb Lucas held was so blurred until he raised his arm to his eyes and wiped away blood.

Lucas offered the brandy again. This time he got it down. Healing warmth spread from his middle. Then he remembered what had happened with one sim while he fought the other, and he went cold again. "Anne!" he cried.

He looked about wildly, and moaned when he saw a blanket-covered form on

not, Edward, she is but stunned," said Allan Cooper's wife Claire, a strong, steady woman a few years older than Anne. "We cast the bedding over her to hide her nakedness, no more."

"Oh, God be thanked!" Wingfield gasped.

"But—" Allan Cooper began, then looked helplessly at his wife, not sure how to go on. He seemed to make up his mind. He bent by Wingfield with Caleb Lucas. Together, they manhandled Wingfield to his feet, guided his stumbling steps over to Joanna's cradle.

He moaned again. It was empty.

Anne sat on a hard wooden chair, her face buried in her hands. She had not stopped sobbing since she returned to her senses. She rocked back and forth in unending grief. "God, God, God have mercy on my dear Joanna," she wailed.

"I will get her back," Wingfield said, "or take such a vengeance that no sim shall dare venture within miles of an Englishman ever again."

"I want no vengeance," Anne cried. "I want my darling babe again."

The colonists' first efforts at pursuit had already failed. They had set dogs on the sims' trail less than an hour after the attack. With the blood Wingfield had drawn, it had been fresh and clear. Only for a little, though: the ground north of Jamestown was so full of ponds and streams that the dogs lost the scent. Further tracking had had to wait for daylight—and with every passing minute, the sims took themselves farther away.

"Why?" Anne asked. The question was not directed at anyone. "Why

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up a defenseless babe? What are they doing to her?''

Wingfield's imagination conjured up a horde of possibilities, each worse than the one before. He knew he could never mention even the least of them to his wife.

But her first agonized question puzzled him as well. He had never heard of the sims acting as they had that night. They killed, but they did not capture—he felt heartsick anew as he worked out the implications of that.

Caleb Lucas said, ''I fear me they but sought specially tender flesh.'' He spoke softly, so Anne would not hear.

Wingfield shook his head. The motion hurt. ''Why take so great a risk for such small game?'' He gritted his teeth at speaking of Joanna so, but went on, ''They would have gained more meat by waiting until one of us stepped outside his cabin to ease himself, striking him down, and making away with him. Cunningly done, they might have escaped notice till dawn.''

''Wherefore, then?'' Lucas asked. Wingfield could only spread his hands.

''What do you purpose doing now?'' Allan Cooper added.

''As I told Anne,'' Wingfield said, rising. His head still throbbed dreadfully and he was wobbly on his feet, but purpose gave his voice iron. ''I will search out the places where the sims encamp in their wanderings, and look for traces of Joanna. If God grant I find her living, I'll undertake a rescue. If it be otherwise—''

Henry Dale stuck his head in the cabin door. His lips stretched back in a savage grin. ''—Then kill them all,'' he finished for Wingfield. '' 'Twere best you do it anyhow, at first encounter.''

''No,'' Wingfield said, ''nor anyone else on my behalf, I pray you. Until I have certain knowledge my daughter is dead, I needs must act as if she yet lives, and do nothing to jeopardize her fate. A wholesale slaughter of sims might well inflame them all.''

''What cares one pack of beasts what befalls another?'' Dale asked scornfully.

Allan Cooper had a comment more to the point. ''Should you fare forth alone, Edward, I greatly doubt you'd work a wholesale slaughter in any case—more likely the sims will slay you.''

That set off fresh paroxysms of weeping in Anne. Wingfield looked daggers at the guard. ''I can but do my best. My hunting has taught me somewhat of woodscraft, and bullet and bolt strike harder and farther than stones.'' He spoke mostly for his wife's benefit; he knew too well Cooper was probably right. Still, he went on, ''You'd try no less were it your Cecil.''

''Oh, aye, so I would,'' Cooper said. ''You misunderstand me, though—my thought was to come with you.''

''And I,'' Henry Dale said. Caleb Lucas echoed him a moment later.

Tears stung Wingfield's eyes. Anne leapt from her chair and kissed each of his friends in turn. At any other time that would have shocked and angered him: now he thought it no less than their due.

Yet fear for his daughter forced expedience from him. He said, ''Henry, I know your skill amongst the trees. But what of you, Allan? Stealth is para-

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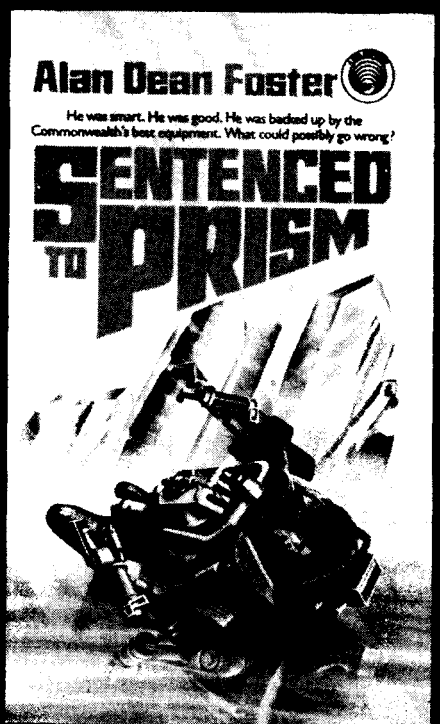
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mount here, and clanking about armored a poor preparation for't."

"Fear not on my score," Cooper said. "Or ever I took the royal shilling, I had some nodding acquaintance with the crown's estates and the game on them." He grinned slyly. Wingfield asked no more questions; if Cooper had made his living poaching, he would never say so straight out.

"What will the council say, though, Allan?" Dale demanded. "They will not take kindly to a guardsman haring off at wild adventure."

"Then damnation take them," Cooper replied. "Am I not a free Englishman, able to do as I will rather than harking to seven carping fools? Every subject's duty is the king's; but every subject's soul is his own."

"Well spoken! Imitate the action of the tiger!" cried Caleb Lucas, giving back one quote from Shakespeare for another.

The other three men were carefully studying him. Wingfield said, "You will correct me if I am wrong, Caleb, but is't not so your only forays into the forest have been as lumberer?"

The young man gave a reluctant nod. He opened his mouth to speak, but Dale forestalled him: "Then you must stay behind. Edward has reason in judging this a task for none but the woodswise."

Wingfield set a hand on Lucas's shoulder. "No sense in anger or disappointment, Caleb. I know the offer came in all sincerity."

"And I," Anne echoed softly. Lucas jerked his head in acknowledgement and left.

"Let's be at it, then," Cooper said. "To our weapons, then meet here and away." Wingfield knew the guard had no hope of finding Joanna alive when he warned Henry Dale, "Fetch plenty of powder and bullets." Dale's brusque nod said the same.

Before noon, the three men reached the spot where the dogs lost the sims' scent. As Wingfield had known it would, the trail led through the marshes that made up so much of the peninsula on which Jamestown lay. By unspoken consent, he and his companions paused to rest and to scrape at the mud clinging to their boots.

His crossbow at the ready, Wingfield looked back the way he had come, then to either side. For some time now he had had a prickly feeling of being watched, though he told himself a sim would have to be mad to go so near the English settlement after the outrage of the night before.

But Cooper and Dale also seemed uneasy. The guard rubbed his chin, saying, "I like this not. I'm all ajitter, as I've not felt since the poxy Spaniards snuck a patrol round our flank in Holland."

"We'd best push on," Henry Dale said. "We'll cast about upstream and down, in hopes of picking up tracks again. Were things otherwise I'd urge us separate, one going one way and two the other, to speed the search. Now"—he bared his teeth in frustration—" 'twere better we stayed in a body."

The bushes quivered, about fifteen paces away. Three weapons swung up as one. But instead of a sim bursting from the undergrowth, out came Caleb Lucas. "You young idiot! We might have shot you!" Cooper snarled. His

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finger was tight on the trigger of his pistol; as a veteran soldier, he always favored firearms.

Lucas was even filthier than the men he faced. His grin flashed in his mud-spattered face. "Send me back now if you dare, good my sirs. These past two hours I've dogged your steps, betimes close enough to spit, and never did you tumble to it. Have I not, then, sufficient of the woodsman's art to accompany you further?"

Wingfield removed the bolt from his bow, released the string. "I own myself beaten, Caleb, for how should we say you nay? The damsels back in town, though, will take your leaving hard."

"They'll have plenty to company them whilst I'm gone, and shall be there on my return," Lucas said cheerfully. "And in sooth, Edward, are we not off to rescue a fair young damsel of our own?"

"Not wondrous fair, perhaps, since the little lass favors me, but I take your meaning." Wingfield considered. "We'll do as Henry proposed before your eruption, and divide to examine the streambank. Caleb, you'll come with me this way; Henry and Allan shall take the other. Half a mile either way, then back here to meet. A pistol-shot to signal a find; otherwise we go on as best we can. Agreed?"

Everyone nodded. A sergeant to the core, Cooper muttered, "As well I don't have Caleb with me—I want a man I know'll do as he's told." Unabashed, Lucas came to such a rigid parody of attention that the others could not help laughing.

He and Wingfield hurried along the edge of the creek, their heads down. Herons and white-plumed egrets flapped away; frogs and turtles splashed into the turbid water. "There!" Lucas said. His finger stabbed forth. The print of a bare foot was pressed deeply into the mud.

"Good on you!" Wingfield clapped him on the back, drew out one pistol and fired it into the air. He reloaded in the few minutes before Dale and Cooper came trotting up.

Dale, who was red as a tile, grunted when he spied the footprint. "The brutes did not slip far enough aside, eh, my hearties? Well, after them!"

The trail ran northwest, almost paralleling the James river but moving slowly away. It became harder to follow as the ground grew drier. And the effort of sticking to it meant the four trackers had to go more slowly than the sims they pursued.

By evening, the Englishmen were beyond the territory they knew well. Explorers had penetrated much farther into the interior of America, of course, but not all of them had come back—and with the colony's survival hanging by so slender a thread, exploration for its own sake won scant encouragement.

At last the thickening twilight made Wingfield stop. "We'll soon lose the trace," he said, smacking fist into palm, "yet I misdoubt the sims push on still. What to do, what to do?"

Again Caleb Lucas came to the rescue. "Look there, between the two pines. Is't not a pillar of smoke, mayhap marking one of the sims' nests?"

"Marry, it is!" Wingfield turned to Allan Cooper, the most experienced of them at such estimations, to ask, "How far away do you make it?"

The guard's eyes narrowed as he

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thought. "The sims favor large blazes, as being less likely to go out. Hmm, perhaps two, two and a half miles—too far to reach before full dark."

"All the better," Dale said. "I'd leifer come on the accursed creatures with them unawares." No one cared to disagree.

Cooper took the lead as they grew closer. "Reminds me of a scouting-party I commanded outside Haarlem," he remarked, and reminisced in quiet tones until they drew within a few hundred yards of the fire.

He stopped then, and waved the others to a halt behind him. "Let me go on alone a bit," he whispered. "If they're smart as Spaniards, the which says not much, they're apt to have a sentry out, and I'll need to scout a way past him."

He slipped away before Henry Dale could voice the protest he was plainly forming. Whether a poacher or not, he had told the truth: he could move silently in the woods. It was too dark to see his face when he reappeared, but his whisper was smug: "The bugger's there, just so. Here, hands and knees now, after me, and he'll never be the wiser."

"That were so in any case," Dale retorted, but he lowered himself with the others.

Again Wingfield caught the thick, warm stench from the sim. It never sensed him or his comrades, who crawled past downwind—another proof Cooper knew his business. The Englishmen peered through a last thin screen of bushes at the band of sims.

Perhaps twenty-five were there. Several slept close to the fire. From time to time, a grizzled male threw a fresh branch onto it: he would let it get low, but never close to going out.

Along with the odors of smoke and sim, the air still held the faint flavor of roasted, or rather burnt, meat. Bones from small game lay about. Every so often a sim would pick one up and gnaw on it.

The sims ate anything. A female turned over stones and popped the grubs and crawling things she found into her mouth or handed them to the toddling youngster beside her. The firekeeper grabbed moths out of the air with practiced skill, crunching them between his teeth.

Another, younger, male was using a hammer made from a piece of antler to chip flakes from a rock he held between his knees.

Wingfield studied the sims with growing disappointment. None bore a knifewound, and he saw no sign of Joanna. The three or four infants in the band all bore a finer coat of the dark brown hair that covered their elders. One was nursing at its mother's breast. It fell asleep in her arms. She set it down on a pile of leaves. It woke up and started to yowl. She picked it up and rocked it till it was quiet again.

Allan Cooper let out the ghost of a chuckle. "Looks familiar, that."

"Aye," Wingfield whispered back. "We may as well be off. We've not found here what we sought."

To his surprise, Henry Dale said, "Wait." He had been watching a pair of sims grooming each other, hands scurrying through hair after ticks, fleas, and lice. The scratchings and pickings had gradually turned to caresses and nuzzlings. Then the sims coupled by the

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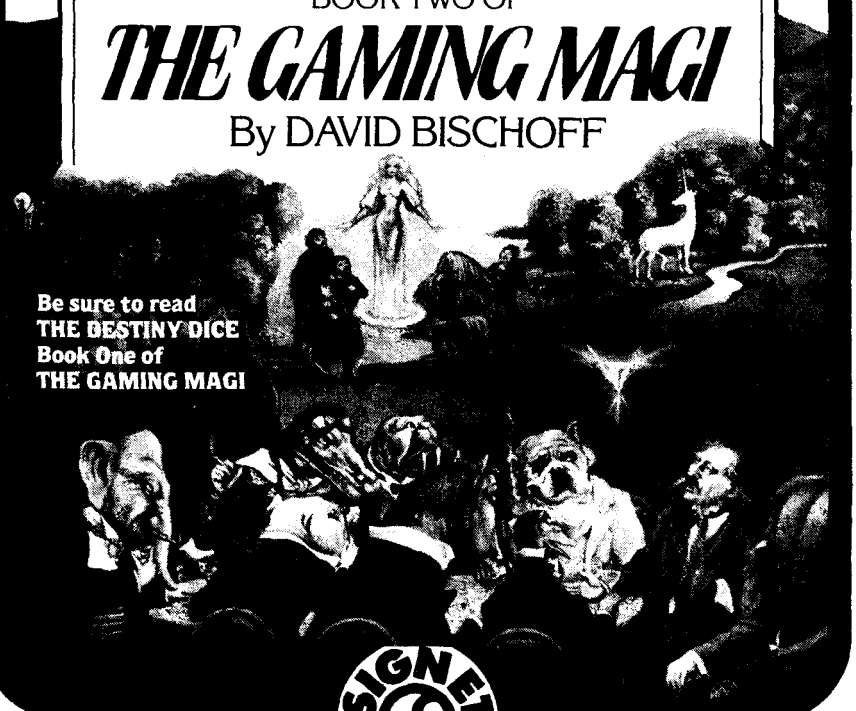

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fire like dogs, the male behind the female. The rest of the band paid no attention.

"Shameless animals," Dale muttered, but he watched avidly until they were through.

He was, Wingfield recalled, unwed, and with his temper had enjoyed no luck among the single women at the settlement. Unslaked lust could drive a man to madness; Wingfield remembered the sinful longing with which his own eyes had followed a pretty cabin boy aboard the *Godspeed*.

But even if sure the prohibitions in Deuteronomy did not apply, he would have let sim females alone forever, no matter what vile rumor said Spaniards did. One could close one's eyes to the ugliness, hold one's nose against the stench, but how, in an embrace, could one keep from noticing the *hair*. . . ?

The sound of the edge of a hand striking a wrist and a harsh whispered curse snapped him from his lascivious reverie. "Be damned to you right back, Henry!" Caleb Lucas said hotly. "Edward said no killings whilst his daughter remained stolen, and if you come to his aid you can do his bidding."

Dale picked up his pistol, which by good luck had fallen on soft grass and neither made a betraying noise nor discharged. "The filthy creatures all deserve to die," he growled, barely bothering to hold his voice low.

His face was pitiless as a wolf's. Wingfield abruptly realized Dale had never expected to find Joanna alive, but was along only for revenge. If by some stroke of fortune they should come across the baby, his comrade might prove more dangerous to her than the sims.

All he said, though, was "My thanks, Caleb. Away now, quiet as we can. We'll hash out what to do next come morning."

Cooper led them away from the sims by the same route they had taken in; again they passed by the lone watcher close enough to catch his reek. They camped without fire, which would have brought sims at the run. After gnawing leathery smoked meat, they divided the night into four watches and seized what uncomfortable, bug-ridden sleep they could.

When morning came, they took council. "It makes no sense," Henry Dale complained. "Where was the sim you fought, Edward? None of the beasts round their blaze showed the knifemark you said you set in him."

"I thought the same, and again find myself without answer," Wingfield said; if Dale was willing to let last night's quarrel lay, he did not intend to bring it up himself.

"Hold—I have a thought," Caleb Lucas said. Somehow he managed to seem fresh on scanty rest. "When we spied the sims' fire, we hared straight for it, and gave no more heed to the track we'd followed. Could we pick it up once more—"

"The very thing!" Allan Cooper exclaimed. " 'Sblood, we're stupider than the sims, for we acted on what we thought they'd done when the truth was laid out before us, had we only the wit to look on it."

"Shorn of the windy philosophizing, the point is well-taken," Dale said.

Before Cooper had time to get angry,

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Wingfield said hastily, "Could you find the spot where we saw the smoke, Allan?"

"Maybe his royal highness there would sooner lead us," the guard snapped. Dale opened his mouth to reply, but Wingfield glared at him so fiercely that he shut it again. At length Cooper said, "Yes, I expect I can."

He proved good as his word, though the trip was necessarily slow and cautious to avoid foraging sims. When the Englishmen returned to the place by the two pines, they cast about for the trace they had pursued the day before.

Cooper found it first, and could not help sending a look of satisfaction at Henry Dale's back before he summoned his companions. They eagerly followed the track, which, to their growing confusion, ran in the same direction they had previously chosen.

"Cooper, we've already seen the brutes did not come this way," Dale said with an ominously false show of patience.

"No, all we've seen is that they did not reach the band. Tracks have no flair for lying." Cooper held his course; Dale, fuming, had no choice but to follow. A few minutes later, the guard stiffened. "Look here, all of you. Of a sudden, they spun on their heels and headed northeast."

"Why, I wonder?" Wingfield said. He glanced toward the column of smoke from the sims' fire, pointed. "They could easily see that from here."

"What does it matter?" That was Henry Dale. "Let's hunt down the beasts and have done with this pointless chatter."

"Pointless it is not," Wingfield said, "if it will help us in the hunting. Were you coming to a camp of your friends, Henry, why would you then avoid it?"

"Who knows why a sim does as it does, or cares? If it amuses you to enter the mind of an animal, go on, but ask me not to partake of your fatuity."

"Hold, Henry," Cooper said. "Edward's query is deserving of an answer. In war, now, I'd steer clear of a camp, did it contain the enemy."

"Are sim bands nations writ in small?" Dale scoffed.

"I tell you honestly, I do not know for a fact," Cooper replied. "Nor, Henry, do you." Dale scowled. Cooper stared him down.

The country rose as they traveled away from the James. The sims they were following stuck to wooded and brushy areas, even when that meant deviating from their chosen course. After seeing the fourth or fifth such zigzag, Cooper grunted, "Nation or no, that pair didn't relish being spotted. Soldiers travel so, behind the foe's lines."

"Even if you have reason," Caleb Lucas said a while later, ruefully rubbing at the thorn-scratches on his arms, "Why did the wretched creatures have to traverse every patch of brambles they could find?"

"Not for the sake of hearing your whining, surely." Had Cooper given Henry Dale that rebuke, he would have growled it. With the irrepressible young Lucas he could not keep a twinkle from his eyes.

All the Englishmen were scratched and bleeding. Wingfield stopped to extract a briar that had pierced his breeches. The bushes around him were especially thick and thorny, their leaves a glisten-

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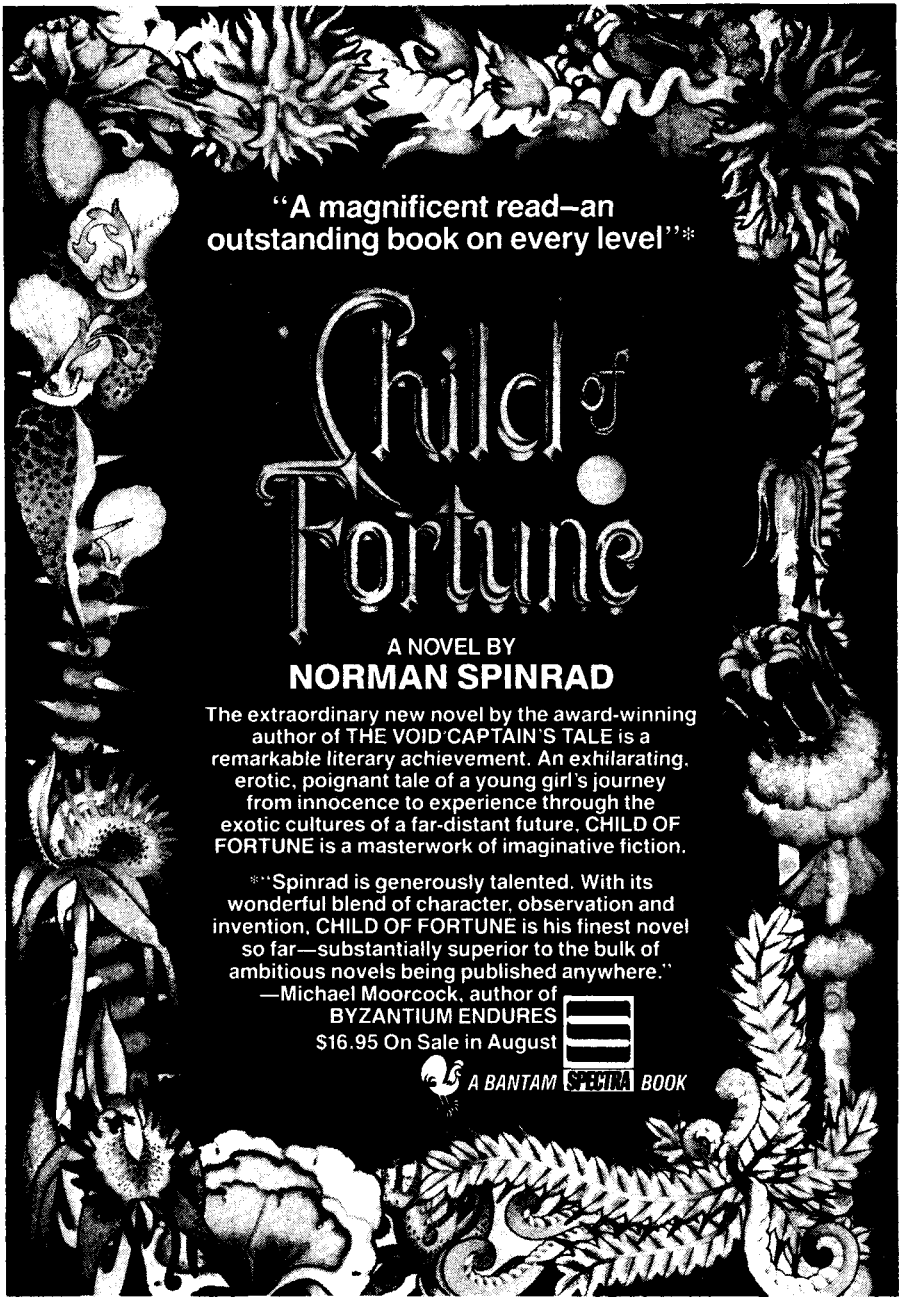
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ing, venomous dark green. Only against that background would the white bit of cloth have caught his notice.

He reached out and plucked it from its bramble without realizing for a moment what it meant. Then he let out a whoop that horrified his comrades. They stared at him as at a madman while he held up the tiny piece of linen.

"From Joanna's shift!" he said when he had calmed enough to speak clearly again. "It must be—the sims know nothing of fabric, nor even pelts to cover their loins."

"Save their own pelts, that is," Caleb Lucas grinned. Then the excitement took him too. "Proof we're on the right track."

"And proof—or at least hope—my little girl yet lives," Wingfield said, as much to himself as to the rest. "Had the sims sought no more than meat, they'd not have left the shift round her so long, would they?" He looked to the others for reassurance.

"It were unlikely, Edward," Cooper said gently. Caleb Lucas nodded. Henry Dale said nothing. Wiping his florid face with his sleeve, he pushed ahead.

Late that afternoon, near the edge of a creek, the Englishmen came upon the scaly tail of a muskrat—all that was left of the beast, but for a blood-soaked patch of grass Allan Cooper found close by. "Here the sims stopped to feed," the guard judged. Further casting about revealed a sharpened stone that confirmed his guess.

"This making of tools on the spot has its advantages," Caleb Lucas said. "One need never be without."

"Oh, aye, indeed, if one has but three different tools to make," Henry Dale said sourly.

Wingfield did his best to ignore the continual bickering. He went over the ground inch by inch, searching for signs of Joanna. He finally found a spattering of loose, yellow-brown muck on some chickweed not far from the edge of the stream. His heart leaped.

The other Englishmen came rushing over at his exclamation. Dale and Lucas stared uncomprehending at the dropping, but Allan Cooper recognized it at once for what it was. "The very same as my little Cecil makes, Edward," he said, slapping Wingfield on the back. "This far, your baby was alive."

"Aye," Wingfield got out, giddy with relief. His greatest fear had been that the sims would simply dash her against a treetrunk and throw her tiny broken body into the woods for scavengers to eat.

"They have her yet, I must grant it," Dale said. "Do they take her back to their fellows for tortures viler than those they might perform in haste?"

"Shut up, damn you!" Wingfield shouted, and would have gone for Dale had Cooper and Caleb Lucas not quickly stepped between them.

"Have you not called them beasts all this while, Henry?" Lucas said. "Beasts kill, aye, but they do not torture. That is reserved for men."

"Leave be, all of you," Cooper ordered in a parade-ground voice. "Yes, you too, Caleb. Such squabbling avails us nothing, the more so when a life's at stake."

The guard's plain-spoken good sense was obvious to everyone, though Wingfield could not help adding, "See you

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remember we know it is a rescue now, Henry. I charge you, do nothing to put Joanna at risk."

Dale nodded gruffly.

The Englishmen hurried on; hope put fresh heart in them and sped their weary feet. Soon they were going down into marshier country again as they approached the York river, which paralleled the James to the north. They all kept peering ahead for a telltale smudge of smoke against the sky.

Darkness fell before they found it. They had to stop, for fear of losing the sims' trail. Wingfield drew first watch. He sat in the warm darkness, wishing he had some way to let Anne know what he had found. His wife would still be suffering the agony of fear and uncertainty he had felt until that afternoon, and would keep on suffering it until he brought their daughter home.

He refused to think of failing. He had before, when he thought Joanna dead. But having come so close, he felt irrationally sure that things would somehow work out. He fought that feeling too. It could make him careless, and bring all his revived dreams to nothing.

When he surrendered sentry duty to Caleb Lucas, he thought he would be too keyed-up to sleep. As it had back on his own bed, though, exhaustion took its toll; the damp ground might have been a goosedown mattress ten feet thick.

Henry Dale spotted the sims' fire first. The Englishmen were much closer to it than they had been to the one a couple of days before, for it was smaller and not as smoky. The hour was just past noon.

"We wait here," Allan Cooper decreed, "so we may approach by night and lessen the danger of being discovered."

They soon found that danger was real. A sim on its way back to the fire walked within a double handful of paces of their hiding-place. By luck, it was carrying a fawn it had killed, and did not notice them.

"Ah, venison," Caleb Lucas sighed softly, gnawing on smoked meat tough enough to patch the soles of his boots.

The wait seemed endless to Wingfield, the sun to crawl across the sky. To be so close and yet unable to do anything to help his daughter ate at him. But getting himself killed with an ill-considered rush would do her no good either.

The Englishmen made low-voiced plans. All had to be tentative. So much depended on where Joanna was around the fire, what the sims were doing to her (Wingfield would not let himself consider Henry Dale's notion), how many sims there were, how much surprise the rescuers could achieve.

At last the birds of day began to fall silent. The sky went gold and crimson in the west, deep blue and then purple overhead. When stars came out not far from where the sun had set, Allan Cooper nudged his fellows. "Now we move—cannily, mind."

The guard led them as they crept toward the fire. He was humming a Spanish tune under his breath. Wingfield did not think he knew he was doing it. But he had learned his soldiering against Spanish troops, and a return to it brought back old habits.

This band of sims dwelt in opener

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country than had the other. The Englishmen could not get very close. Half their plans, the ones involving unexpectedly bursting from the woods and snatching up Joanna, evaporated on the instant. They whispered curses and watched from the nearest shrubbery.

At first glance the scene in front of them did not seem much different from the one they had watched a couple of nights before. There were more sims here, perhaps as many as forty. Three or four males were roasting roots and bits of meat on sticks over the fire, and passing the chunks of food to sims who stood round waiting.

Another male was cutting up an animal that, with the removal of its skin, Wingfield could not identify. He stiffened—that was no stone tool the sim used; it was a good steel knife. Henry Dale noticed that at about the same time he did. "Damned thieving creatures," he muttered.

A female set the young one she was holding in her arms down on the ground. She rose and ambled away from the fire, probably to relieve herself. The infant followed her with its eyes. It shrieked in distress. She came back and played with it, dangling it in her arms, rolling it about, and making faces at it. After it was quiet, she left it again. This time it stayed quiet until she returned.

This band did not have one firekeeper, as the other had. From time to time, a female or young male would come up to the blaze and toss on a branch or a shrub. The system seemed haphazard to Wingfield, but the fire never looked likely to go out.

A group of sims had gathered on the far side of the fire around something their bodies kept Wingfield from making out. Whatever it was, it mightily interested them. Some stood, others hunkered down on their haunches for a closer look. They pointed and jabbered; once one shook another, as if to get a point across. Wingfield could not help chuckling to himself—they reminded him of so many Englishmen at a public house.

Then the chuckle died in his throat, for he saw that one of the males there had a great glob of mud plastered to the hair from its ribcage. The sim moved slowly and painfully. Wingfield touched Cooper's arm. "On my oath, that is the one I fought. I knew I marked him with my knife."

"Then we tracked truly, as I thought. Good. Now we—"

Wingfield's hand clamped down tight on the guard's wrist, silencing him. From the center of that tightly packed bunch of sims had come a familiar thin, wailing cry. "Joanna!"

"How do you know 'tis not one of their cubs yowling?" Henry Dale demanded. "All brats sound alike."

"Only to a single man," Wingfield retorted, too full of exaltation and fear to care how he spoke. Against all hope, his daughter lived, but how was he to free her from her captors? And what—the question ate at him, as it had from the outset—what had prompted the sims to steal her in the first place?

A couple of sims stepped away to take food, opening a gap in the crowd. "There, do you see?" Wingfield said triumphantly. No matter how dirty she was (quite, at the moment), smooth, pink Joanna could never be mistaken for a baby sim.

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As if to make that pikestaff plain, one of the sims' infants lay beside her on a bed of grass and leaves. Terror stabbed Wingfield as an adult ran its hand down his daughter's chest and belly, but then it did the same to the hairy baby next to her. It stared at its palm, as if not believing what it had felt.

The sim Wingfield had wounded held up one of Joanna's hands, then that of the infant of its own kind. Then it held up their feet in the same way. The other sims grunted. Some looked at their own hands and feet, then toward Joanna's. Except for size and hairiness, there was not much difference between their members and hers.

But then the sim patted Joanna's smooth, rounded head, and that was nothing like what the tiny sim next to her had. Already its brow beetled bonily, and above it the skull quickly retreated. Noticing that, one of the adults rubbed her own receding brow. She scratched, for all the world as if lost in thought.

"What are they playing at?" Henry Dale whispered harshly. Wingfield, at a loss, could only shrug.

Caleb Lucas said, "If a tribe of devils set up housekeeping outside London and we wished to learn of what they were capable, were it not wise for us to seize on a small one, knowing full well a grown devil would drag us straight to perdition?"

"Why are you dragging in devils?" Dale did not have the type of mind that quickly grasped analogies.

Allan Cooper did. "Youngster, meseems you've thrown your dart dead center," he said. "To the sodding sims, we must be devils or worse." He stopped, then went on, sounding surprised at where that line of thought had taken him, "Which would make them men of a sort, not so? I'd not've believed it."

Wingfield paid more attention to Joanna than to the argument. She was still crying, but did not seem in dreadful distress. It was her hungry cry, not the sharper, shriller one she used when gas pained her or something external upset her.

The female sim who had scratched her head might have been the mother of the infant with whom Joanna was being compared. She took Joanna away from the wounded sim and lifted her to a breast. The baby nursed as eagerly as if it had been Anne. Wingfield told himself that was something his wife never needed to know.

He invented and discarded scheme after scheme for rescuing his daughter. The trouble was that the sims would not leave her alone. Even while she was feeding, they kept coming up to stare at her and touch her. She ate on, blissfully oblivious to everything but the nipple.

"By God, I *shall* get her back," Wingfield said.

He spoke loud enough to distract Allan Cooper. "What? How?" the guard said.

And then Wingfield knew what he had to do. "Do you three cover me with your weapons," he said, "and should the sims harm Joanna or should I fall, do as you deem best. Otherwise, I conjure you not to shoot." Before his comrades' protests could more than begin, he got up from his concealment and walked into the light of the sims' fire.

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The first sim to see him let out a hoot of alarm that made the rest of the band whip their heads around. He walked slowly toward the fire, his hands empty and open; he had left his crossbow behind when he rose.

Had the sims chosen to, they could have slain him at any instant. He knew that. His feet hardly seemed to touch the ground; they were light with the liquid springiness fear gives. But the strange unreality of the moment gripped the sims no less than him. Never before had an Englishman come to them alone and unarmed (or so they must have thought, for the pistols in his boots did not show—in truth, he had forgotten them himself).

But then, the sims had never stolen a baby before.

Females snatched up youngsters and bundled them away in their arms as Wingfield passed. Lucas had it right, he thought wryly; it was as if Satan had appeared, all reeking of brimstone, among the Jamestown cabins.

He stopped a few feet in front of the male he had fought. That one had stopped to grasp a sharp stone; many of them lay in the dirt round the fire. But the male made no move to attack. He waited, to see what Wingfield would do.

The Englishman was not sure if the sim knew him. He pointed to the plastered-over cut he had given; to the bruise and scab on his own forehead; to Joanna, who was still nursing at the female sim's breast. He repeated the gestures, once, twice.

The sim's broad nostrils flared. Its mouth came open, revealing large, strong teeth. It pointed from Wingfield to Joanna, gave a questioning grunt.

"Aye, that's my daughter," Wingfield said excitedly. The words could not have meant anything to the sim, but the animated tone did. It grunted again.

Wingfield dug in his pouch, found a strip of smoked meat, and tossed it to the sim. The sim sniffed warily, then took a bite. Its massive jaw let it tear and chew at the leathery stuff where the Englishman had to nibble and gnaw, and made its smile afterward a fearsome thing.

When Joanna finally relinquished the nipple, the sim holding her swung her up to its shoulder and began pounding her on the back. The treatment was rougher than Wingfield would have liked, but was soon rewarded with a hearty belch. The female sim began to rock Joanna, much as Anne would have.

Wingfield pointed to his daughter, to himself, and then back in the direction of Jamestown. As best he could, he pantomimed taking Joanna home. When he was done, he folded his arms and waited expectantly, trying to convey the attitude that nothing but going along with his wishes was even conceivable.

Had he hesitated, faltered for an instant, he would have lost everything. As it was, that aura of perfect confidence gave him his way. None of the sims moved to stop the female when she came forward and set Joanna in his arms.

He bowed to her as he might have to a great lady of the court, to the sim he had fought as to an earl. Holding Joanna tightly to him, he backed slowly toward the brush where his companions waited. He expected the tableau to break up at

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any moment, but it held. The sims watched him go, the firelight reflecting red from their eyes.

He was close to the place from which he had come when Caleb Lucas said from the bushes, "Splendidly done, oh, splendidly, Edward!" His voice was a thread of whisper; none of the sims could have heard it.

"Aye, you have the girl, and good for you." Henry Dale did not try to hold his voice down. Indeed, he rose from concealment. "Now to teach the vermin who stole her the price of their folly." He aimed a pistol at the sims behind Wingfield.

"No, you fool!" Lucas shouted. He lunged for Dale at the same moment the sims cried out in fear, fury, and betrayal. Too late—the pistol roared, belching flame and smoke. The lead ball struck home with a noise like a great slap. The sim it hit shrieked, briefly.

With a lithe twist, Dale slipped away from Caleb Lucas. His hand darted into his boot-top for his other pistol. The second shot was less deliberately aimed, but not a miss. This time the screams of pain went on and on.

By then Wingfield was among the bushes. Behind him, the sims were boiling like ants whose nest has been stirred with a stick. Some scrambled for cover; others, bolder, came rushing after the Englishman. A stone crashed against greenery bare inches from his head.

"No help for it now," Henry Dale said cheerfully, bringing up his crossbow. The bolt smote a charging sim square in the chest. The sim staggered, hands clutching at the short shaft of death. It pitched forward on its face.

More rocks flew. Wingfield turned to one side, to try to shield Joanna with his body.

Allan Cooper got to his feet. "God damn you to hell for what you make me do," he snarled at Dale. He fired one pistol, then a second, then his crossbow.

A sharpened stone tore Wingfield's breeches, cut his thigh. Had it hit squarely, it would have crippled him. The sims were howling like lost souls, lost angry souls. Dale was right—no help for it now, Wingfield saw. His pistol bucked when he fired one-handed. He did not know whether he hit or missed. In a way, he hoped he missed. That did not stop him from drawing his other gun.

"You purposed this all along, Henry," he shouted above the din.

"Aye, and own it proudly." Dale dropped another sim with a crossbow bolt. He turned to kick Caleb Lucas in the ribs. "Fight 'em, curse you! They'll have the meat from your bones now as happily as from mine."

"No need for this, no need," Lucas gasped, swearing and sobbing by turns. But whether or not that was true he realized, as Wingfield had, that there was no unbaking a bread. His pistols barked, one after the other.

But the sims on their home ground were not the skulking creatures they were near Jamestown. Though half a dozen lay dead or wounded, the rest, male and female together, kept up the barrage of stones. Their missiles were not so deadly as the Englishmen's, but they loosed them far more often.

One landed with a meaty thud. Allan Cooper, his face a mask of gore, crumpled slowly to the ground.

Dale shot his crossbow again, wounded

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another sim. He turned to Wingfield, who was struggling to fit another bolt into his weapons' groove. "Go on!" he shouted. "You have what you came for. I'll hold the sims. As you say, I am to blame here."

"But—"

Dale whipped out his rapier. Its point flickered in front of Wingfield's face. "Go! Aye, and you, Caleb. I promise, I shall give the brutes enough fight and chase to distract 'em from you."

He sprang into the clearing, rushing the startled sims. One swung a stout branch at him. Graceful as a dancer, he ducked, then thrust out to impale his attacker. The sim gave a bubbling shriek; blood gushed from its mouth.

"Go!" Dale yelled again.

Without Joanna, Wingfield would have stood by the other Englishman no matter what he said. When his daughter squalled at the rough treatment she was getting, though, he scrambled away into the woods. Lucas followed a few seconds later.

For as long as they could, they looked back at Henry Dale. After that first one, no sim dared come within reach of his sword. He stayed in the clearing for what seemed an impossibly long time, stones flying all around him.

At last he turned. "Catch me if you can!" he shouted, brandishing his rapier. Wingfield saw how he limped as he ran; not every stone had missed. Dale crashed through the undergrowth, going in a different direction from his comrades and making no effort to move quietly. His defiant cries rang through the night. So did the sims' bellows of rage as they pursued him.

"You make for home," Caleb Lucas urged Wingfield. "I will give Henry such help as I may."

"They will surely slay you," Wingfield said, but he knew he would not hold Lucas back. Had their positions been reversed, he would not have wanted the youngster to try to stop him.

Just then, the sims' shouts rose in a goblin chorus of triumph. Screams punctuated it, not all from an English throat. As Dale had promised, he did not die easily. Caleb Lucas sobbed.

"Come," Wingfield said softly, his own voice breaking. "Now we have but to save ourselves, an we may."

Wingfield lay on the straw pallet in his cabin, having scant energy for more. After the desperate dash back to Jamestown, he was gaunt rather than lean. Insect bites blotched his face and arms; leeches had clung to his legs when he and Lucas plunged into the swamps to elude the sims.

The worshipful looks Anne sent his way went far to ease the memory of his privations. She had hardly let Joanna out of her arms since Wingfield came stumbling home the night before. The baby was nursing again. It had done little else, once reunited with its mother.

The sound of weeping came through the doorway. That too had gone on since the night before, when Claire Cooper learned she was a widow.

Anne sighed. "So high a price—two good men lost, to rescue a single babe."

Wingfield nodded. Lucas and he had agreed there was no point to speaking ill of the dead. Let Henry Dale be remembered as a hero; with his folly forgotten, the tale of his undoubted bravery

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at the end of his time would inspire those who still lived.

Wingfield did say, "Aye, we lost a pair, but the sims paid far dearer than we." That far, at least, Dale had been right, he thought, though better none had died on either side. He went on, "Their bands range widely, but they are small; this one took a hurt from which 'twill be years recovering."

"Good!" Anne said, a fierce light in her eyes. "The sooner those foul animals are driven far from the haunts of men, the sooner we sleep at our ease of nights."

"As you've said, my dear, in the past I've taken both sides of that question, but now I will name the sims men." Wingfield spoke reluctantly but firmly.

"How can you think that, after what your own daughter suffered at their hands?" Anne ran her hand protectively over Joanna's scanty yellow hair.

"Anne, were they beasts they would have slain her. Instead, the kept her hale as best they might. Caleb feels they sought to learn of us from her, as the Spaniards have fetched sims back to Europe for learned men to study. Having thought much on what I saw, I can draw no other conclusion than that he is right."

His wife remained unconvinced. "Man or beast, what boots it in the end? We should rout out savages no less than wild beasts, or with all the greater vigor, as presenting more danger to us and ours."

"But if they be men, it were wrong to slay them out of hand, as one would so many wild dogs: our souls should suffer for't."

"What then?"

"I cannot say," Wingfield admitted. He had not thought it through, he was still exhausted from his adventures, and in any case he did not seek a quarrel with his wife. When he continued, he was musing aloud: "They are less than we; that no one may deny. Perhaps God has set them here as our natural servants. If that be so, 'twere a wicked waste to flout His will by expunging them from the Earth."

To his relief, Anne let it go with a noncommital, "H-m-m." She had a strong will of her own, and was not usually shy about expressing it, but with Joanna safely home she did not really care what her husband believed.

For his part, Wingfield was also willing to let the conversation flag. He kept returning to the image Caleb Lucas had summoned up, of demons settling on good English soil. Even if they purposed benevolence, how like were their purposes to coincide with his countrymen's?

No more so, he answered himself, than that what Englishmen and sims intended would correspond. If they were men, the sims would struggle against their fate with every fiber of their being.

Not, he thought, that it would do them much good.

He closed his eyes and tried to sleep. ■

● To stimulate creativity, one must develop the childlike inclination for play and the childlike desire for recognition.

Albert Einstein

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James E. Oberg

RUSSIANS TO MARS?

Mars may be closer than you think—but who will get there first?

Late in 1984, a volley of "space shots" from Russian space scientists surprised the world with a new message: yes, they said in unison, we Soviets do intend to send men to Mars, and in the foreseeable future. And a joint mission was also unexpectedly endorsed by some prominent American space scientists who had previously not been noted for their enthusiasm for manned space flight.

Soviet chief scientist Aleksandrov, president of the Academy of Sciences in Moscow, led off the barrage. "Soviet space engineers are at work developing the hardware for manned flight to Mars, and that is our goal," he announced in a brief statement. A few weeks later, a new book was released by chief Soviet space engineer Konstantin Feoktistov. Western news accounts reported that he claimed the technology for such a mission was already within the hands of his spacecraft design bureau.

If these bold statements surprised most of the world, they were no shock to one small group of Americans. In fact, the timing of the announcements strongly suggests that it had been the Soviets who had gotten the latest version of the idea from these Americans in the first place.

In July 1984 a group of space enthusiasts had met in Boulder, Colorado, to discuss the "Case for Mars." Three years earlier, they had gathered furtively, as heretics and hopeless dreamers. But in the intervening short span of time, the idea of manned flights to

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Mars had "come in from the cold" and achieved new responsibility.

As one demonstration of this, numerous current and former NASA officials attended the weeklong seminar. One was Dr. Thomas Paine, former director of NASA. He was there to warn of what he saw as the next round of the ongoing "Space Race," the Soviet-American cosmic competition thought by many to be in remission or even entirely over. Not so, warned Paine: the Russians have now set their sights on Mars.

Paine fleshed out his prediction with a fictitious "history" of the next century. For the 1995-2005 decade, he imagined it this way: "This decade opens with a triumphant Soviet expedition to Mars, including docking scenes at Phobos. . . . The President of the United States orders the Vice President to overhaul the American space program; she begins by firing the Administrator of NASA for lack of boldness." A new national goal is set: "A permanent settlement on Mars."

All fictionalizing aside, Tom Paine really felt that a Soviet manned Phobos mission in the 1990s was a distinct possibility. "I believe there will be this galvanizing event," he forecast.

Predicting Soviet space intentions that far in the future is a risky business. Vague official comments about "someday" voyaging to the Moon and other planets can hardly be construed as evidence for budgetary line items. And the risk is always present that cynics would view such claims by prospace experts as merely public relations gambits to rally public support for increased NASA spending.

Nevertheless, a careful catalog of current and near-future Soviet space capabilities does show that the "building blocks" for manned interplanetary flight are being assembled, for whatever purpose. Certainly there are other near-Earth purposes to which they could be applied, but their very availability makes a downstream man-to-Mars decision easier and cheaper.

The most obvious Soviet capability is in long-term manned space flight. Already, several cosmonaut teams have spent orbital expeditions equivalent in duration to the six-to-eight month voyage out to Mars. Aboard twenty-ton "Salyut" modules, these men have developed the techniques to maintain human health—both physical and mental—for the kinds of time spans needed for interplanetary travel. Visiting the marathon three-man crew of Salyut 7 in mid-1984, cosmonaut Vladimir Dzhanibekov praised their "psychological state": "When the time comes for long interplanetary voyages, as it surely will, this crew will be a model," he exulted.

The Salyut 6 space station spent five years in space between 1977 and 1982, and the Salyut 7 operated for three years from 1982-1985. Such modules could easily be modified to serve as life-support spacecraft for a mission to Mars and back.

A key technology development effort in Soviet space activity involves gardens in space. These greenhouses would help purify air and eventually would provide a large fraction of the bulk food mass

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needed for life support on very long missions. Only three years ago, cosmonauts in orbit succeeded in growing plants from seed to maturity to the production of new, fertile seeds, a major breakthrough. On Earth, experimenters have set up hermetically-sealed closed-loop ecologies with humans inside, which have functioned for many months. And no secret is made of the fact that such biological and botanical research is intended to support cosmonauts on very long space missions.

Recent NASA-sponsored research has indicated that the break even point for "space gardens" is six to eight years, making such systems not practical for two- or three-year-long interplanetary expeditions. But these calculations did not take into account the economics if such a system already existed aboard a space station and could then merely be modified for far ranging expeditions. That is the position the Soviets will be in in the 1990s.

In the area of space propulsion, it is becoming clear that the Soviets are preparing a major new "big push." For more than twenty years, their space activities have relied on the same family of rocket boosters, developed in the 1956-1965 period and improved only marginally since that time. But orbital flight tests of small unmanned "spaceplane" models have already begun, and a large "shuttleski" similar in size and configuration to NASA's spaceship has reportedly been photographed by spy satellites. Two new expendable boosters are also believed to be under development, one more powerful than the extinct Saturn V of moon race days. And an observer does not have to depend only on Pentagon statements and on Russian dinner table gossip for supporting evidence: astronauts on space shuttle flights over the USSR (such as Spacelab 1 in December 1983) have described and photographed massive new launching pad construction areas at the Tyuratam space center, including several booster assembly buildings which rival the pyramids in size.

The development schedule and intended payloads for such rockets, the first new Soviet space boosters in twenty years, are uncertain. They will probably be phased into operational use over the rest of the 1980s. Hopefully, they will be used for scientific and applications purposes, such as a large twenty-man space station. Ominously, they could as easily be used for emplacing and servicing space laser battlestations. But in either case, the boosters would still be available for other missions as well.

Beyond Earth orbit, more efficient propulsion systems would be useful in reducing the mass needed for an interplanetary spaceship. So it comes as no surprise that Soviet spokesmen have been publicly discussing the utility of developing upper stages powered by nuclear energy. These would be similar to NASA's NERVA program of the late 1960s, an American effort which withered because it had no plausible mission short of manned interplanetary flight. If such a program is flourishing in the USSR (as some American intelligence reports confirm), it is an unambiguous tipoff of long-range Soviet intentions.

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Such technologies could be "on line" by the early 1990s. Best of all, they would have been paid for by other, more immediate programs, thus substantially diminishing the cost of applying them to subsequent objectives. But hard engineering analysis still leads to the need for a thousand-ton space complex in low Earth orbit, to support a small cosmonaut crew out onto Mars and back. This is six to eight times greater than the equivalent mass needed for an Apollo lunar mission, and even with these expected Soviet boosters it would be a massive undertaking.

Now enter the "Case for Mars" conferences. In 1981 and again in 1984, these private colloquia have sought—and, happily, identified—numerous technological shortcuts to reduce the Earth-departure weight of a manned Mars spaceship. One can postulate that, space engineering being invariant to the language spoken at the meetings, the private American groups would only be following a logical path parallel to official (and secret) Soviet discussions of the same topic. Anything bandied about in Boulder must have been talked about in Tyuratam—and probably years earlier.

One key concept only recently reaching maturity in Western space circles is the possibility of on-site fuel production at Mars. The Martian atmosphere provides one source of raw material, but an even more attractive supply dump actually exists at a far more convenient location. It (actually, they) is a moonlet, either Phobos or Deimos, several thousand miles above the planet.

Both objects are evidently composed of carbonaceous material, of the consistency of soft coal but probably in fragmentary form. This is known from meteorite studies to be rich in water. Photographs of the surface of Phobos show chains of dimple craters that apparently were left by steam vents formed when the moonlet's interior was heated by an impact which created Stickney Crater.

Assuming that Phobos contains water, the steam could readily be driven off by heating (with solar mirrors or with the spacecraft's idling nuclear reactor), and then electrolysed into oxygen and hydrogen propellants.

If a departing man-to-Mars spacecraft does not need to bring with it the fuel needed to get back from Mars, straightforward computations show that its starting mass in low Earth orbit can be cut by a half to two thirds! This puts it well within the reasonable range of 1990s-era space freight capabilities.

So exciting were the results of these analyses that many of the Boulder conferees urged an immediate campaign to get NASA to send a small unmanned "Phobos Prospector" mission to Mars as soon as possible. The technology would not be difficult, nor would the cost be particularly great. A single PAM booster in a quarter of a shuttle payload bay would suffice to launch it. And the payoff could be a shortcut to a whole new world.

In this frame of mind, it should be easy to appreciate the raised eyebrows and indrawn breaths caused at the conference by the news, which spread by

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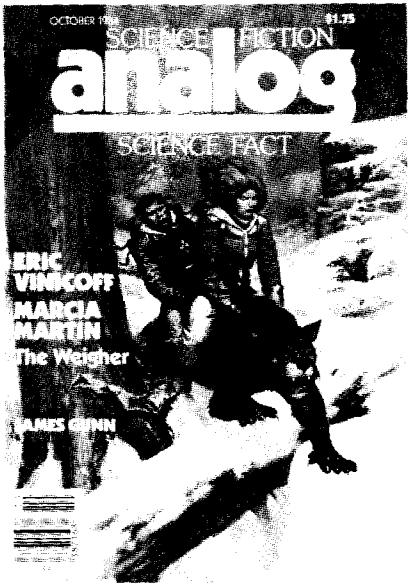

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word-of-mouth and drew confirmatory details from several independent specialists, that the Soviets have already mapped exactly such a mission! It was to be a Mars orbiter and Phobos rendezvous, and probably would involve the launch of two separate spacecraft. Originally scheduled for the April 1986 Mars window, it had just recently been pushed off to the June 1988 window so as to allow for the inclusion of high-quality French instruments designed for laser spectroscopy of the surface of Phobos.

Pure scientific curiosity, of course, could be behind this drive to assay what Phobos dirt is made of. But tied in with the other strands of current and developing Soviet manned space technology, it was to most observers clinching proof that a Soviet manned Mars orbital mission could be under way by the mid to late 1990s. Paine's warning was not mere rhetoric, or so it seemed.

Using a strategy as outlined above, such a mission scenario suddenly fits nicely within the Soviet capabilities now under development. The sequence of missions could go something like this.

First, cosmonauts would be sent on a yearlong manned interplanetary mission, venturing at most a few million miles out from Earth and involving repeated lunar fly-by maneuvers to prove out guidance and navigation techniques. They would ride a modified Salyut module with an equal-sized supply module attached, and have a modified Zond-Soyuz command module for launch and landing. The fifty-ton spacecraft could be lofted by a single launch of the big booster.

Next, the same type of spacecraft, using a nuclear powered upper stage, could be sent on a two-year Mars fly-by. The supply module would include a greenhouse. Only a small course change maneuver would be needed at Mars, and no attempt would be made to go into a close orbit of the planet. However, if it were desired to linger nearby, the vehicle could use the fly-by maneuver to steer itself into the Sun-Mars Lagrange Point #2, several million miles downsun of the planet, there to float for weeks or months at very little cost in fuel. Perhaps probes could be dispatched into the atmosphere and into the surfaces of Phobos and Deimos. A single big booster launching would be more than adequate, assuming the NERVA-class upper stage was operational.

The third step would be for the same type of spacecraft, with an add-on propellant module and special mission equipment, to be assembled in low Earth orbit by two big booster launches. Total starting weight would be about three hundred tons, two thirds of it fuel to escape from Earth. The hundred ton spacecraft would reach Mars and use its propellants to brake into orbit (sophisticated aerobraking techniques would probably not be cost effective for a Phobos-compatible orbit, although they would be so for a lower altitude orbit). Then it would rendezvous and "land" ("dock" would be a more descriptive term, so weak is the moonlet's gravity) on Phobos. The empty fuel tank would

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not be cast off, because the cosmonauts' main task in the next year and a half would be to extract and process Phobos water into propellant for the return trip.

To do this, they would burrow into the soil of Phobos and build a semi-permanent base, underground and thus protected from radiation. They would set up greenhouses on the surface to raise food and process their air. And they would, on occasion, glance up at Mars in their sky overhead. It would be *almost close enough to touch, only almost*. . . .

This need not be a suicide "do-or-die" mission, either. If after a year or so it is discovered that the fuel supplies cannot be produced, the follow-on expedition (missions are launched about every two years, during a brief interval when the two planets line up properly) could serve as a rescue and retrieval, or as a resupply to bring necessary new equipment.

But if all is going well, the next (or the one after) could be sent, again with only two big booster launchings, with a Mars lander module instead of an Earth-return module. The crew, or their replacements, could fuel up the module and make the final landing.

The enabling technology to this amazingly easy man-to-Mars scenario is on-site fuel, air, and water production. And all the evidence is that the Soviets are energetically developing precisely the right kinds of keys to go into the locks which stand between now and then.

*This man-to-Mars vision is so attractive that space enthusiasts should per-*force treat it with cautious skepticism. The Soviets may have distinctly different space missions in mind, and they may have no objection in having Western observers misinterpret their intentions so astronomically. In fact, they could well be willing and able to spread appropriate rumors so as to encourage this delusion.

In October 1984 the Planetary Society published results of costing estimates for a variety of future manned space missions. A small scientific Moon base would cost $17 billion, according to the Science Applications International Corporation. A manned asteroid reconnaissance would cost about the same, while a full-scale Mars landing was twice as expensive. This compares to the cost of the Apollo program ($75 billion in same-year dollars), the Space Shuttle ($17 billion), and the Space Station ($10 billion start-up).

The manned Phobos mission should cost about the same as the baselined asteroid rendezvous, less than one fourth the amount spent on getting astronauts to the Moon in the 1960s.

So inexpensive are manned Mars expeditions of this and other configurations—running from a quarter to about half of what Apollo cost, in comparable expenditure levels—that the argument for international cooperation as a cost reduction measure evaporates. Indeed, several countries or alliances or consortia could afford such missions, and in fact one purpose might be to import Phobos-produced water and propellants back to the Moon, or even low Earth

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orbit, there to be sold at a considerable profit!

As for the technological needs of combining the space capabilities of the major spacefaring nations, that argument too is shaky, seeing as how the Soviets seem to be pushing their capabilities across the board. In terms of completeness of the "building blocks," the USSR is going to be a lot closer to 100% than is the USA in the same time period. Is there any hope that the Soviets might see the advantage of joint mission?

If there is, it is in the actual Mars lander hardware, and possibly in the Phobos fuel processing technology. In both of these areas, American space technology could have significant contributions to make. Additionally, American deep-space guidance and navigation technology is the best in the Solar System.

At the same time, Soviet long-duration life support and heavy-payload launch capability will be unmatched in this century.

Perhaps a complementary melding of these capabilities could make such a mission even more attractive—and more imminent—than it currently appears. However, such a plan would have to overcome significant barriers. And in any case it could hardly be expected to make either nation's total mission expenditure any cheaper: whatever is saved in acquiring 'free' technology would be spent in ensuring its compatibility and interface reliability.

Analogies with Apollo-Soyuz and even with a projected Shuttle-Salyut mission are not particularly valid or relevant. For that first joint endeavor in 1975, pre-existing technology was used (and in fact, on the American side, the Apollo/Saturn technology was already obsolete), thus relieving authentic concerns over technology transfer. For a hypothetical Shuttle-Salyut mission of the mid-1980s, the interfaces are very clean and any required data disclosures are clearly demarcated. But for joint planning for NEW hardware, technological interrelationships would have to be much more intimate, on a level at which previous Soviet behavior gives little grounds for encouragement.

Additionally, one must keep in mind the political purposes of the projects. The Soviets agreed to Apollo-Soyuz in order to pose as equals to a space program which had in fact already beaten them at every finish line of the 'space race.' They have not yet agreed to any sort of Shuttle-Salyut activity, under current diplomatic conditions. And if in fact they are serious about sending men to Mars, it is not for science or even for practical gain, it is to prove the superiority of the "Soviet way of life." An international mission, however much cosmonauts may pay lip service to its desirability, would pull the rug out from under the main reason Moscow would see for even making the trip—unless more pressing motivations were developed, an eventuality I sadly consider unlikely.

A cynical observer also should be cautious about the ideological basis of endorsements by Carl Sagan and other long-term critics of manned space flight.

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They transparently see "man-to-Mars-international" as an alternative to "Star Wars," feeding the aerospace industry on a major non-military project. This idea is not without merits of its own, but such motivations must be understood and the possibility of shifting commitments not overlooked.

Nor should the Soviet statements be overenthusiastically misinterpreted. Feoktistov was not nearly as gung-ho as Western press accounts described. His actual words were clearly negative: "I do not believe that a mission to Mars will be made in the next ten to fifteen years," he wrote. "And the question is not at all one of whether today's technology is capable of this. For now, it is not capable, but if the necessity for a mission to Mars should arise, the preparation for such a mission would take perhaps less than ten years."

He continued, in the one line taken out of context by the news media: "The development of a ship for a mission to Mars is entirely within the possibilities of contemporary technology. It is another matter that today there is really no goal in sight which would make such a mission to Mars necessary."

Still, cooperation at Mars can certainly take less integrated forms. A pattern for a reasonably useful level of cooperation already exists in the Antarctic experience. Coordinated observation programs and exchange of scientific and engineering data would no doubt be valuable, and might be as much as we could hope for.

And the building blocks are being developed, whatever the long-term intentions—if any.

What about the prospects for a joint US/USSR/etc. mission? If the Soviets are quite possibly considering manned Mars missions around the end of the century, while "optimistic" NASA officials talk about dates between 2012 and 2040, why should the Soviets want to wait for us to catch up? It is, after all, the Red Planet! ■

LEO R. SUMMERS, 1925-1985

Leo Summers, well known to *Analog* readers for occasional covers and a great many interior illustrations, died April 1 of brain cancer in a New York City Veterans' Hospital. Born in Los Angeles and raised and educated in Seattle, Leo served in the U.S. Navy in the South Pacific during World War II. Beginning in the 1950s he pursued an extensive and distinguished career as artist and art director, working for magizanes and books both in science fiction and in a variety of other fields. His career was interrupted in the late 1970s by a brain tumor which required lengthy hospitalization, but he was able to resume his work for *Analog* and other clients after surgery. His unfortunate death this year came after a long new illness. He will be missed by his readers, writers, and fellow artists.

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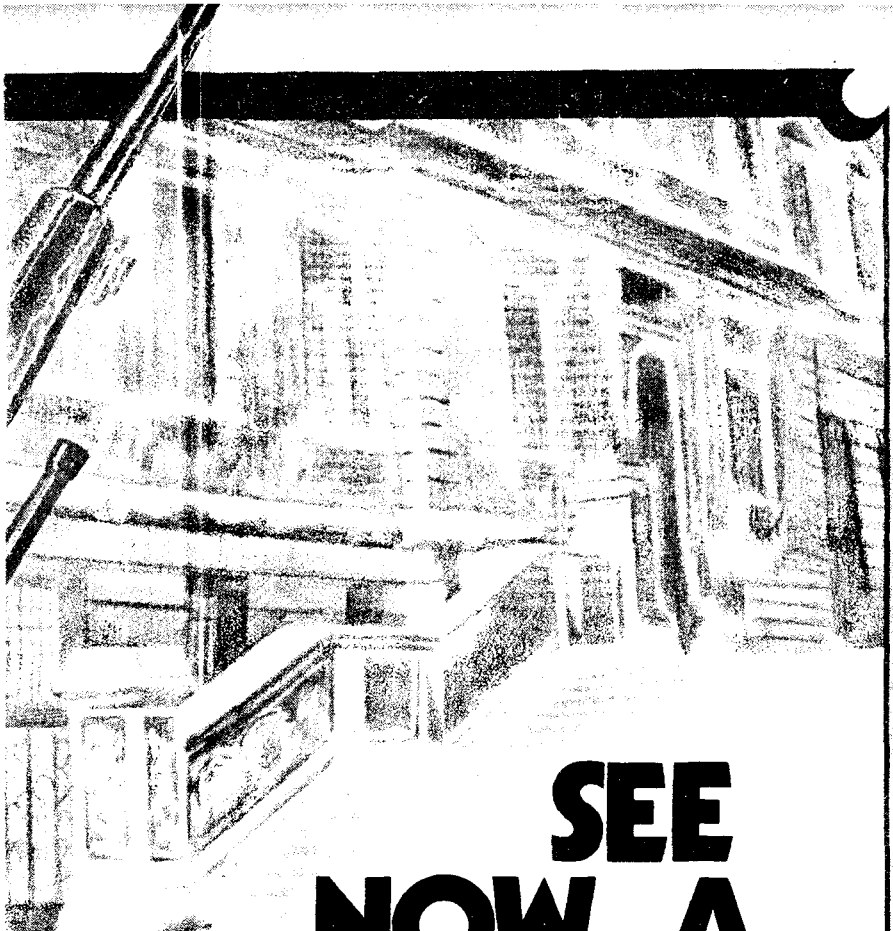

SEE NOW, A PILGRIM

Gordon R. Dickson

A prime requisite in any struggle is to know your enemy—and yourself.

Nicholas Jainschigg

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There were fourteen of them, gathered in the small room of an empty warehouse about a table made of two smaller tables pushed together.

They were the London area Resistance leaders, according to what the man whom Shane knew only as Peter had claimed; and Peter, himself, was obviously in command. As he had been the obvious commanding figure—even though he was not the local leader—of the group in Milan, Italy that had kidnapped Shane after he had rescued the young woman named Maria from the Aalaag. Maria Casana—whom he somehow hoped to save from all this.

The light in the room came from kerosene lamps, spaced on the long metal worktable, whose mantles hissed and glowed whitely inside their glass chimneys. The illumination they gave seemed hardly less than the same number of hundred watt electric bulbs would have given, and Shane drew the edges of the cowl to his cloak closely together before his face.

He had not taken the chair that had been placed for him and he remained the only one standing in the room. At the moment he was hollow inside with the empty sense of isolation that had been with him all his life; and he did not trust himself to talk to these people, seated.

This sort of confrontation was not what he was good at. His way had always been to avoid crowds and gatherings. He was a loner; and while he could be effective in conversation or even argument one on one, he had never had the experience or desire to address a number of people at once. It was ironic, given his instinct always to avoid groups and organizations. Events had seemed to contrive to draw him away from that instinct ever since the moment two years before in which he had gone slightly insane for the first time in his life, and as a result drawn the stick figure of the pilgrim on the wall below the man the Aalaag had executed in Aalborg, Denmark. His aim in life had always been to live as quietly and unobtrusively as possible, and make the most of his good fortune at being one of the favored group of human translator-couriers employed by the First Captain, leader of the aliens on the now-captive Earth.

Now, instead, he found himself getting deeper and deeper into this Resistance and everything it implied, including having to deal with those seated before him at this moment. He had no experience at addressing a number of people at once, let alone trying to convince and command them with something he, himself, knew to be a lie. But any other way meant death, eventually, a slow and painful death at the hands of the Aalaag.

His only hope, he thought, looking at their faces, was to make a virtue of that same loneliness and isolation in himself. He could never be one of them, so let him not try. In fact, let him make a virtue of being different; of being, if necessary, someone they would not like —if giving that would also give him the difference, the distance and authority he would need to control not only these, but the others he would have to deal with later—others who would be stronger, brighter, and more experienced than the fourteen before him now, with the possible exception of Peter.

"We're perfectly safe here," Peter

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said, speaking from his own chair at the far end of the makeshift conference table, down its long length to Shane who stood opposite, at the other end. "You can take off that hood now, and let the rest of them here have a look at you. And sit down."

"No," said Shane.

The negative had been instinctive —almost reflexive in its protectiveness. But the moment it left his lips he found himself explaining with hardly a pause.

"If I could find some way of doing it," he said, as he remained standing, "I'd erase what I look like from your memory, and the memory of anyone who was with you when you saw me. For what's going to need to be done, my face is going to have to stay unknown. Either that, or I'm not going to have any part of what all of you are doing. I know the Aalaag better than any of you ever will. You've got everything to gain by dealing with me. But you'll deal with me with my face hidden or not at all."

"What indeed is it we're going to do together, then?" said Peter. "We're waiting to hear that."

Seated at the far end of the table, Peter looked an unlikely person to hold authority over these others around him, some of whom had reached into the second half of life's century and many of whom looked more like leaders than he did. He was boyishly round-faced and round-skulled, with thin, straight brown hair on top of the skull. His appearance was that of a man in no more than his early twenties, but Shane judged him to be thirty at least.

"I'm going to show you how to get rid of the Aalaag, of course," Shane said. "The same thing you and others like you have been trying to do ever since the aliens landed, but without succeeding in anything much more than sitting around and talking about it, or marking on walls—"

There was a murmur that was half a growl from those around the table. Their faces were not friendly.

"Like it or not, it's a fact," Shane said. "I tell you, I know the Aalaag, in a way none of you ever could. With my help you've got some hope at least. Without me, you've got no more than you ever had—and that's nothing at all. Your attitude here isn't very hopeful. I did a lot of thinking before I decided to get back in touch with you people."

He paused. None of them said anything.

"I want you to be completely clear about this," he said. "I can help you — but I'm putting my own life on the line to do it. I know, the rest of you are all doing that, too. But you've made your choice. Mine means taking chances none of you have to take and whether I do that depends on you. It depends, in fact, on whether we can agree to work together, exclusively and exactly on my terms."

He paused again.

"You could be a spy for the aliens," said a man in his forties with a heavy jaw, halfway down the table to Shane's left. Shane laughed; and he did not have to exaggerate the bitterness of that laughter. It came up like an acid bubble from his stomach into his throat.

"Now, there's a perfect example of why you've never won anything against the Aalaag by yourselves, and never will," he said. "That's exactly the kind

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of thinking that leaves you helpless where they're concerned. You think of yourself as equal to the Aalaag, with the only difference between you and them the fact that they've got a massive edge in technology over anything we humans ever came up with. You think of them basically as equals under their armor and without their weapons—''

''Well, aren't they?'' demanded the man with the heavy jaw. ''Those things, and a little more height and some extra muscle. That's all the difference, and they act like they're gods and we're dirt!''

''Maybe they're right; maybe the gap is there. Maybe they are gods and we're dirt. Anyway, it doesn't matter. Who knows?'' Shane laughed again. ''The point isn't whether you actually are their equals or not, but that you make the mistake of thinking you're their equals. As a result, you instinctively assume they also think of you as equals; which is so far from their thinking that they'd have trouble believing you could imagine something like that. To you, it might make sense to send a spy among troublemakers of a subjugated race. To them . . . would you send a laboratory mouse to spy upon other mice in your walls that you wanted to get rid of? Can an animal be a spy? And if it could, what could it report back to you, other than that its own kind in the walls were there—and you know that already. Sooner or later, with poison and traps, you'll get rid of them anyway; so why this nonsense of sending a beast just like them to 'spy' on them?''

Shane stopped speaking. The others around the table stared back at him and said nothing for a long moment. Then Peter spoke.

''My apologies, fellow fighters,'' he said. ''I brought you here to meet this man who calls himself Pilgrim because I thought he could be useful to our Resistance effort. I still think so. Very useful. But I had no idea he'd start out by insulting us. In fact, I don't see the reason and the sense behind his doing it, even now. Why, Pilgrim?''

''Because there's no use our talking unless I can get through to you on a level where your minds have been closed from the start,'' Shane answered. ''I repeat, I can show you how to get rid of the Aalaag. But to do what can be done, you've first got to face some facts and get rid of some illusions; and the first of those is the one that someday you're going to be able to fight them and beat them. Get it clearly into your heads that if there were only one Aalaag on Earth, short of surrounding him or her with a wall of living human flesh, renewed as fast as he killed those who made it up, you couldn't even contain him, let alone conquer him.''

''Even if there were only one, it'd be worth doing,'' shouted a small man with a face like a dried apple, farther down the table than the heavy-jawed man.

''That's right,'' said a thick-bodied, thick-faced woman. ''He'd have to run out of power for his weapons sooner or later.''

''Do you know he'd run out—or do you just assume that?'' retorted Shane. ''That's a human assumption; I've lived with the Aalaag for over two years and I'll tell you I wouldn't take it for granted that he'd run out of anything. No, in fact, what I'd assume would be that his

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power would last beyond the point where the last person on Earth was dead. You see, you're doing it again; thinking of them in the terms you understand, assuming human limitations to them and what they own. And that's the most basic error of all."

"What are you trying to tell us, then?" said the heavy-jawed man. "That we can't win?"

"Not in any face-to-face, stand-up fight with them, no. Never," said Shane. "Get it through your heads, clearly, once and for all. You can never destroy the Aalaag. But, what you might be able to do is trick them into leaving this planet and going someplace else."

"Go someplace else? Go where?" The female voice came from close to Shane on his right, and by the time he had pulled his gaze back from the heavy-jawed man, there was no way he could tell which of the three women seated close to him on that side of the table had spoken.

"Who knows? Who cares?" Shane said. "Somewhere where they'd find another race to subjugate, one that'd look more profitable to own than we are."

The heavy-jawed man snorted and leaned back in his chair, tilting it on its two back legs.

"Just ask them to go away, I suppose?" he said.

"No," said Shane. "A lot more than that. There'd be a lot more to do to get that done, by work a lot more difficult and a lot more painful than that. But we're getting ahead of ourselves. First I've got to be sure you're ready to listen to me and believe me when I tell you about them as they really are—and that means there isn't one of you who's not going to have to give up at least one pet notion you've believed in since they came, and replace it with a truth that'll be a lot less comfortable for you to accept. But if you don't want to listen to me, I don't know what I'm doing here."

"In other words," said Peter, unexpectedly, "he's asking you to listen."

"Listen—and believe," said Shane. "Unless you can believe what I tell you—really believe it, so that you'll act on it as fact in the future—you're headed for disaster, taking probably a lot of other people along with you. I don't want to be one of them."

"Pilgrim," said Peter, "I'm sure we're all convinced of your instinct for self-preservation by now, if nothing else. Why don't you just go ahead and tell us whatever it is you have to tell us about the Aalaag?"

Shane looked around the table.

"I'm not yet convinced that all of those here are ready to believe."

"You don't want much," said Peter. "You come among us with no credentials, you won't show your face, you make claims of having a long and close acquaintance with the aliens—but there's no way we can check that. And you want us simply to take your word for anything you tell us about them, even if it goes against our own experience and knowledge. Can you blame us for reserving belief in you and what you're going to say?"

"No. But I have to have that belief, all the same," Shane said. "Let me see if I can convince you, then."

He paused and looked around the table, deliberately into the faces of all of them there.

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"As I said, I've spent more than two years past among the aliens. Some of you must have been fighting them, or thinking and planning about fighting them at least that long. Tell me, in all that time, have any of you come up with any kind of plan for any way of doing it?"

There was silence as he looked around the table again.

"I take it, you all recognize you haven't," he said. "Tell me this, then. You've been ready to give your lives to fight them, if some kind of workable plan could be made. Are you still ready to do that?"

Again there was silence, but the expressions on the faces were answer enough.

"All right," Shane said. "Now I come along. All I have to offer is something that might not work. But it also might work—which is more than you or anyone you know has been able to come up with in two and a half years or more. And I tell you that to get a chance to use it you have to take me as I am—without questions about myself—and believe what I tell you about the Aalaag. Isn't it worth your accepting that for the chance—even just the chance—of doing what you've been trying to do so long without success?"

Silence, then the voice of the heavy-jawed man.

"You've got to give us some reason to believe you," he said. "Tell us some sort of reason to go along with you."

"All right," said Shane. "I'll say this much. You haven't been able to fight the Aalaag on your own. But if you listen to me I think I can show you how to make them fight themselves, by taking advantage of what they really are, and what they really think."

No one said anything.

"Well?" asked Shane after a moment. "Does that give you reason enough to try to believe what I'll tell you?"

Peter said nothing at the far end of the table. He only sat, a little sideways in his chair as if his legs were crossed to one side, just clear of the overhang. He seemed, not so much to be smiling, as to be about to smile.

"All right," said the heavy-jawed man at last. "I'll listen—with an open mind. If I can believe you, I'll go with you."

Slowly, one by one, the mutter of assent sounded about the table.

"Anyone still not ready to listen and give me credit for knowing what I'm talking about?" asked Shane.

No one moved or spoke.

"All right," said Shane. "Then I'll go back to what I said in the beginning. From the start you've thought of the Aalaag as equals and assumed they thought of you as equals. They don't. They call you beasts, and they not only don't think of you as anything but beasts, they'd find thinking of you as anything else inconceivable. Now, contrary to what you believe, the things that make them think that way aren't their superiority in weapons and armor at all—they take those things for granted, as the sort of advantage superior beings like themselves would naturally have."

He paused and smiled at them.

"Don't any of you have any idea why they think so little of you? So little, in fact, that they've never really made a serious effort to get rid of those like

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you, here, who meet to plan how you'd fight against them?"

"Now wait a minute," said the thick-bodied woman, "you can't tell us they aren't out to get rid of us!"

"Oh, certainly they are, when they stumble across you marking on a wall, or breaking one of their laws. But they know—which you don't—there's no way you can do them any real harm. So most of your secrecy and your organizational mumbo-jumbo is unnecessary. The Aalaag destroy you when they find you, not because they consider you in any way dangerous, but because they consider anyone who doesn't obey the law as insane; and insane animals should be destroyed before they contaminate others of their kind. That's all."

He paused to let his words sink in. No one spoke up, but he thought he could see several of them seemingly teetering on the edge of accepting them.

"Let's get back to why the Aalaag simply take it for granted you're an inferior race of beasts. All the evidence, from their point of view, points to that. Before they came, crime was common in all parts of our race. To an Aalaag, any crime—even the telling of the smallest lie—is unthinkable. Do you know why?"

"We don't know they don't lie," said Peter.

"I do; and you better take my word for it I'm right. To lie, to disobey an order, to do anything that's been established as forbidden is unthinkable to them, because it would be contrary to the survival of their race. And it's that survival, not the survival of any individual one of them, that's the first concern of each one of them. Where we have an instinct of self-preservation, they've got a reflex of race preservation."

"You call ours an instinct, theirs a reflex!" said Peter, calmly, from the distant table end.

"That's right. Because theirs is one they've developed over the last few thousands of years in order to survive. I believe there was a time when they didn't have it. But that was before they were driven from their own home worlds by some race with either numbers or powers superior even to them. I haven't been able to learn the whole story. But from what I can gather, they fought back hard at that time, with pretty much the weapons they have now—but they lost, because at that time they were a people as varied in occupation as we were. Only a handful were trained fighters, though they all had to fight before they were finally forced to turn and run for it. They've been something like interstellar gypsies ever since; and in that process they've given up every profession but one. Now, every individual among them is a fighter, and as a race they live under the fear of being followed and attacked again by whoever drove them from their home worlds in the first place."

"Given this is all true," said Peter, "how does knowing it help us? It seems to me you've just made a case for the aliens' being less vulnerable, rather than more."

"No," said Shane, "because in making themselves over into a race in which everyone was a warrior, they were left without people to fill the support jobs and positions. They solved that problem by finding and taking over worlds, each

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of which had a race that had developed some technology but was not by Aalaag terms 'civilized.' Our world, for example. These subject races filled the support vacuum. They could be made to supply the needs not only of themselves, but of a certain number of Aalaag overlords. That way the problem was solved."

"As Peter says," spoke up the female voice Shane had failed to identify before—he turned his head quickly enough this time to see her now, still speaking. She was a tall, dark-haired young woman only three chairs from him on his right. "How does that make them vulnerable?"

"Why," said Shane, "because to control a subjugated race like ours and make it produce for them means that a large proportion of the Aalaag here have to spend all or most of their time making sure the individuals of that race do what needs to be done, from the Aalaag point of view. If you like, call it an economics of power. So much in the way of supplies for the Aalaag requires so much time and effort spent in maintaining control over us."

"But what can we do about it?" asked the heavy-jawed man.

"Make it too expensive to maintain that control," said Shane.

"How?"

Shane drew a deep breath.

"That," he said, "is what I'll tell you only after I'm sure you understand the Aalaag and me; and after a worldwide structure of Resistance members has been set up, so that we can act all together and at the same time—as we'll have to when the time comes. What I've just told you is all I'll tell you for now."

"You can't leave us like that," said the thick-bodied woman. "You've still given us no proof of any kind, no real reason to believe you."

Shane hesitated.

"All right," he said. "I'll tell you this much that you don't know. Right now, in this city a pilot program is being set up by the Aalaag which involves the establishment of a human governor for Britain, Ireland, and the islands around them: a governor who with his staff will be responsible to the Aalaag for all production from this area, and who'll have the powers of the Aalaag behind him to enforce any rules or laws he cares to make. I'll be heading directly to that governor's new headquarters now, when I leave you."

There was a long second of silence as those around the table stared at each other.

"It'll never get off the ground," said the heavy-jawed man. "We'll make sure nothing about that governor arrangement works."

"No, you won't," Shane said. "Just the opposite. You'll cooperate in every way, if you're going to be part of what I have in mind—what I'll be telling you about in detail eventually. For now, if you'll just get used to believing the fact that you can never win by going against the Aalaag in any head-on fashion, we'll have taken the first step together. I'll leave you to think that over for now. The only way is to make the Aalaag defeat themselves."

Shane stopped talking and took a step back from the table.

"Peter," he said, looking directly down at the other man, "you and I need to talk, privately."

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Peter was already on his feet and coming toward him, up around the table, behind the backs of those there who were also on their feet but had fallen into a buzz of conversations with their near neighbors.

"Have you got a vehicle of some kind?" Shane asked quietly as the other came up to him.

"My car's outside. Yes," said Peter. He grinned. "And I've not only got a permit to have it on the streets, but an adequate gas supply."

"Then you can drive me where I need to go and we can talk on the way," said Shane.

Once in the car and proceeding down streets that were already beginning to shine oily under a fresh, light rain, Peter was the first to bring up the subject.

"What was that all about, then?" he asked.

"It was what you might have expected, when you introduce me to a room full of people who work for you and tell me they're the heads of independent cells in the Resistance."

"And you didn't think they were?" Peter's tone was just shy of a mocking note.

"I know they weren't. First, they all gave in to you and waited for you to lead things; secondly, you couldn't get together a group of your equals that quickly—to listen to someone they knew nothing about and you hardly knew more."

"I might," murmured Peter, "be somewhat more important than you think in certain circles."

"Now," Shane went on, "I'm going to need a liaison to the Resistance Supreme Council, or whatever it'll end up being called. I want you for that."

"Thank you." The words were quiet and ironic.

"Don't bother. You just happened to be the first Resistance leader I met; and you've already seen what I look like. But I eventually want you to run that particular Supreme Council, or whatever, so that between the two of us, you and I, we can make decisions and act on them without putting everything to a vote and getting bogged down in parliamentary procedures."

"I see," said Peter, this time with no humor or any other overtone to his voice at all. Almost absentmindedly, he wheeled the car smoothly around a corner.

Silently watching the other man out of the corner of his eyes, Shane felt a deep sense of relief to find out he had not been wrong.

"The first thing I'll need you to do," said Shane, "will be to get together a meeting of all those who could be called national leaders of the Resistance—"

Something very close to a splutter from Peter interrupted him.

"Are you insane?" Peter exploded. "Do you think you've stumbled on to a world-wide organization already set up on strict military lines? Resistance is a game anyone can play—"

"I know I haven't," Shane interrupted him in turn. "But something pretty close to that is what I'm going to need before I'm done. You're going to help me get it. Now, if there's no such thing as national leaders to the Resistance groups here and across Europe, then what have we got available if we try to get a congregation of Eu-

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ropean leadership together? Because that's what we're going to have to have."

"For what?"

"For putting the kind of unified pressure on the Aalaag that is going to be needed to get them to leave this world."

"You know," said Peter, glancing sideways at him for a second, "you're talking nonsense. It may have been all right for those people back there. But you've got to tell me something to convince me first you aren't either mad or some kind of con man."

"That's a ridiculous statement," said Shane. "It implies a question you'd already answered for yourself when you asked me to get in touch with you again, back in Milan; not to mention the fact that just now I was able to tell you and the others about the new Governor setup. I'm your pipeline to Aalaag Headquarters—something so rare and valuable to you, you never even dreamed of having anything like it. You know it. I know it. That's why you'll take me on my terms or not at all. Besides, you're not unintelligent. When I understand the Aalaag a few orders of magnitude better than any of the rest of you, you ought to be able to see why I could be telling the truth—and take me on faith until you've got some further evidence to judge me by."

"But you want us to follow you blindly," said Peter.

"That's right. It's the only safe way for me, so those are my terms, to start off with at least," answered Shane, losing patience. "Now, if there's nothing resembling an international organization of the Resistance, you still must know people of authority on the continent I could talk to. Am I right, or wrong?"

"Well," said Peter slowly. "Every large city has its important Resistance figure. Anna ten Drinke in Amsterdam, Albert Desoules in Paris, and so forth. We can invite them to get together with us, but—"

"Good. You take care of that," said Shane. "I want them here for a meeting on a date no more than two weeks from now."

"Two weeks! It'll take most of a week just to contact them. It can't be done in any time as short as that—"

"It better," said Shane, grimly. "I'm only supposed to be here for three weeks; and even at that something could come up that would make the First Captain call me back early. If there's to be any margin for unavoidable delays, two weeks is the most we can give any of them to get here."

"Next," said Peter, equally grimly, "who says they'll come? There's no reason for any of them to risk the trip. They don't know you from Adam. I can invite them, but if any show up it'll be a miracle."

"It's up to you to convince them to come," said Shane. "If they're the kind of people to deserve their reputations, they ought to be smart enough to see the advantages of having someone like me on their side—just as you did. I think if you tell them about how I can get them information from Aalaag Headquarters—but don't tell them anything else you know or think you've guessed about me, if you don't mind—I think you can get some of them here. Those who don't come will just have to regret

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they didn't and hope to hop on the bandwagon later on."

"It's all very well for you to pronounce an ultimatum," Peter said. "But a certain amount of delay is built into the system itself—we can't just drop them a post card, you know."

"No, you wouldn't," said Shane, wearily. "For what it's worth, the mails are as safe as any courier's pouch. The Aalaag haven't the time or the interest—you remember my telling your people just now about the mice in the walls—to monitor all the mail that's written in the hope of catching a few Resistance people or other humans who're doing something illegal. But, do it your way."

"We pass messages from hand to hand, to small boats crossing the Channel to the continent and so on. At any rate it'll take three days . . . we're here," interrupted Peter, putting his foot on the brake of the car.

"Keep going!" said Shane swiftly. He glanced at the structure Peter had indicated with the wave of one hand. It was a large, brick building, with an entrance to what seemed a courtyard through which could be seen some ordinary human vehicles parked. "Turn a corner and drop me off out of sight, so I can walk back."

"What's up?" demanded Peter, accelerating none the less. "The most they can guess if they see you is that you came here in one of the free-lance cabs. There's lots of those nowadays. Anybody with the gas to burn who needs money for something on the black market—"

"It's not me, it's you," said Shane. "One of the Interior Guardsmen they'll be sure to have there might just be watching; and he just might be someone who recognizes you as a member of the Resistance."

"Me?" Peter hooted. "If one of those bastards in the Interior Guard'd suspected me, I'd have been picked up by them months ago—years ago."

"There's another of your bits of misknowledge of how the Aalaag and those who serve them work," said Shane. "Any Interior Guardsman with any experience makes it a point to find someone arrestable and then keep that information tucked away until he needs it, either to gain points with his superiors or to balance off some infringement of the rules they've caught him at. It doesn't always work for them, but most older Guardsmen have the equivalent of a whole pocketful of bits of information like that. You can let me out here."

They were around the corner. Peter pulled the car to a halt beside the wet curb. Shane got out. He pulled his staff from the rear seat where he had put it on getting into the car, jerked his hood more fully over his head and ran through the still-falling light rain toward the corner around which was his destination.

He turned in at the courtyard entrance, finding some small shelter from the falling water, and hurried across the open space, past half a dozen human cars and two of the Aalaag mercury-shining vehicles, then up a flight of half a dozen stone steps to a heavy door. Without ceremony he pushed it open and stepped inside, to find himself standing between two young fresh-faced giants of Interior Guard enlisted men.

Neither of them made any move

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either to stop or acknowledge him. The door here would be controlled by Aalaag equipment and it would not have opened to his hand if that equipment had not somehow recognized him and his right to enter. A few steps farther on brought him through a sort of small cloakroom or anteroom into a larger foyer with a marble floor and dark woodwork on the walls. A desk with an Interior Guard officer was at his right, and ahead to his left a wide oak staircase led up a flight of steps to the floor above. An elevator for Aalaag use had its door inset in the wall opposite the staircase. A lieutenant in the Interior Guard sat at the desk; and this man did look up at Shane as Shane stopped before him.

"Shane Everts?" asked the officer, automatically, looking back down at the screen inset in the surface of his desk. "Yes," said Shane. The question and the answer would be recorded as password and countersign, for future reference by their masters and the machinery at their masters' disposal.

"We've been expecting you." The Lieutenant was as tall, but of slighter build than the two enlisted Guards at the door and looked if anything younger than they did. "If you'll take a seat over there—" he nodded at some benches against the wall opposite his desk—"someone will be down in a moment to take care of you."

The situation was all so normal and pre-Aalaag in what was being said and done that Shane was briefly but suddenly moved almost to tears.

"Thank you," he said, adding his bit to things-as-they-once-had-been; and sat down on the bench.

Less than five minutes later, a Colonel of the Interior Guard, a tall, thin, narrow-faced man in his forties with neatly-combed, straight gray hair, descended the staircase and greeted Shane.

"I'm Colonel Rymer," he said, extending his hand for Shane to shake. "We're glad to have you here. The immaculate sir Laa Ehon has been interested in seeing you as soon as possible."

"Right now, you mean?" Shane asked—for it was not unheard of for him to be ushered in to see one of the aliens immediately on arrival, for all that he was usually made to wait at least an hour or so.

"If you're presentable." Colonel Rymer ran his eye over Shane's cloak and staff. "I don't know enough about that outfit. Are you?"

"Presentable enough to be let in to see the First Captain back at Headquarters," said Shane.

"You should be all right here, then," said Rymer.

"Laa Ehon makes a point of appearance?" Shane asked. "I only met him once before and he didn't say anything to me about it."

"Perhaps you were lucky. Perhaps you were all right," said Rymer. "But he likes things correct."

"Thanks for telling me," Shane said.

Rymer shrugged. "You asked."

They had reached the top of the stairs. They made a right turn into a corridor that had been enlarged to Aalaag-comfortable dimensions, and followed it to a door at its far end.

Rymer touched the door with his index finger.

"Come," said an Aalaag voice; and they stepped through into a room not so large as the office of Lyt Ahn with

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which Shane was familiar, but nonetheless a good-sized office with its windows replaced by wall viewing screens and an Aalaag officer of the twelfth rank seated at a desk to one side of the entrance. Straight ahead, behind an exactly equivalent desk, sat an Aalaag of the sixth rank, whom Shane recognized as Laa Ehon.

"This is the courier beast?" Laa Ehon asked Rymer.

"Yes, immaculate sir," answered Rymer.

"You may stay for the moment. Courier beast—what is it the First Captain calls you? Shane-beast, you may come to the desk, here."

Shane walked forward until he was only the regulation two paces of distance—Aalaag paces—from the front edge of Laa Ehon's desk. The large white face, lean by Aalaag standards, examined him.

"Yes," said Laa Ehon, after a moment, "I might almost recognize you. You stand with an attitude a little different from that of other beasts I have seen. Do you know if your dam or sire were known for any noticeably different way of standing?"

"I do not, immaculate sir," said Shane.

"It doesn't matter. But it will be convenient for me to recognize you on sight. I have an eye for beasts and can often tell one from the other. You've met the Colonel Rymer beast; and you will be having to do with Mela Ky, of the twelfth rank, who is my adjutant and shares this office with me." Shane turned his head to meet the colorless gaze of the alien at the other desk.

"I am honored to encounter the untarnished sir," he said.

Mela Ky neither answered, nor changed expression. He went back to his work.

"The First Captain," said Laa Ehon, "has expressed a wish that you act as liason between himself and myself. He also informs me he has asked you to observe and report on the beasts making up this controlling staff with which we are experimenting here. With my concurrence, of course. I am happy to concur with the First Captain in this."

Shane said nothing. Nothing in what Laa Ehon had said had called upon him to acknowledge, respond, or comment in any way.

"The Colonel Rymer beast will introduce you to the cattle of the staff, from the beast who is Governor on down," Laa Ehon went on. "Thereafter you may observe them as you will—avoiding as much as possible any interference with their work. You may also observe, but of course not interfere, with the activities of the Colonel Rymer-beast and his company of Interior Guard in their duties. In the case of any questions, you will come to me. In fact, we will be talking regularly. In my absence, you will treat the sir Mela Ky as myself."

Silently, Shane took this last piece of information with a measured amount of skepticism, born of his experience at the First Captain's Headquarters. In the momentary, transient relationships of most humans to their alien masters, such a statement could be taken literally. But in a situation like this where contact between specific individuals of the two races was not only close but continuing,

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it was not always exactly true that one Aalaag could be counted on to act as another. The aliens had individual personalities, and the human who had to live closely with them learned it was wise often to know which alien to ask what and when.

But he said nothing. Again, no verbal reaction had been called for from him. Colonel Rymer, out of his field of vision behind his back, had also not been called on to speak and was similarly silent.

"That much disposed of," said Laa Ehon, "I am interested in talking to you now on various matters. Colonel Rymer-beast, you may wait for Shane-beast outside. Mela Ky, would you be so kind as to go prepare the governor-cattle to be of use and cooperative with this liaison?"

"Gladly, immaculate sir," said Mela Ky, getting to his feet behind his desk. Two long strides took him to the door, through it, and out. Colonel Rymer followed him.

"Now we will talk," said Laa Ehon. His eyes were unmoving on Shane. "While you are of course a beast of the First Captain, here you are also under my command; and I have a duty for you."

These words, of course, did require an answer from Shane; and there was only one which could be given.

"I am honored, immaculate sir," said Shane.

"My understanding," said Laa Ehon, "is that you will report back to the First Captain regarding the success of this experimental project, and also on the beasts who are being used to staff it, so that he may make his best estimate of the project's future success. To the best of your knowledge, that is your duty here for the immaculate sir, Lyt Ahn, is it not?"

"Yes, immaculate sir."

"I am extremely interested," said Laa Ehon. "This seems to me to be very useful information and information that I would do well to have myself. I have no wish, of course, to know what you will report to the First Captain, but I have decided that in addition to examining the situation and the cattle connected with this project for Lyt Ahn, you will also examine these things and report separately on them to me."

He paused.

"It will be an honor to do so, immaculate sir," said Shane.

"Good. Such understanding in a beast is most desirable. I have been very interested in you, in any case. You are clearly a valuable beast. I would have concluded as much, even if I had not learned of the high price set upon you by the First Captain. What is your rank?" Shane was caught unawares. Everything, to the Aalaag, was ranked — according to usefulness, according to value, according to desirability. As a result, even he and the others in the translator-courier corps had been assigned ranks; but as these had no real purpose or use, they were referred to so seldom he had almost forgotten his. If he had forgotten, it would have been necessary to guess at his rank, hoping that Laa Ehon would not check to see that he had told the truth. But luckily, in that moment, his memory was with him.

"I am of ninth rank in the translator-courier corps."

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"Of ninth? You might be interested to know that at our last meeting of senior officers, the First Captain gave us all to understand you were one of his most valuable, if not the most valuable, of your corps of cattle—"

It was typical, thought Shane, that while Laa Ehon undoubtedly remembered that he had been frustrated at that same meeting by Shane's protest that the human children brought up in alien households might learn to understand but not speak the alien language, his Aalaag social blindness to the presence of beasts had caused him to overlook the fact that Shane would also have overheard and understood what Lyt Ahn had said about Shane's value, at the meeting.

"—and on the basis of what I have seen of you so far," Laa Ehon was going on, "that confidence of the immaculate sir does not seem to have been misplaced. Indeed, if your value had not been so great in Lyt Ahn's mind, I might have bought you to start my own corps of translators."

"I am honored, immaculate sir," said Shane through stiff lips.

"In which case, I might well have ranked you of no less than second rank. However, it now seems unlikely—"

Laa Ehon paused to stare at the plain gray expanse of one of the large viewing screens on the wall to his right. As his eyes fastened on it, it cleared to give a view of the London outside the building. The clouds had brought the darkness of evening down promptly upon the city, and the rain still fell.

"—that I will be purchasing you," finished Laa Ehon, looking away from the screen, which immediately became blank again, and fixing his gaze once more on Shane. "However, I think you might not despair of reaching the second rank, eventually—that is, if my early opinion of you is borne out."

Shane felt an ugly chill within him.

"Thank you, immaculate sir."

"I think that is all, for the moment," said Laa Ehon. "You will find the Colonel Rymer-beast outside and inform him it is my order he take you to, and make you acquainted with, the governor staff cattle. You may go."

"Immaculate sir." Shane bent his head in a gesture of understanding, and took a step backward before turning and going to the door to let himself out. In the hall, Colonel Rymer stood a little to one side of the doorway, patiently waiting.

"Done in there, are you?" said Rymer as Shane emerged. "It'll be my job to introduce you to our fellow-humans, now. Come along."

It was on the fifth day after his arrival that Shane came back to his hotel room and found a note shoved under his door, that said merely "Kensington Gardens. 4:00 PM."

Since it was already eighteen minutes past six in the evening, Shane angrily tore up the piece of paper and dropped it in the wastebasket beside the tiny desk with which his room was furnished. He had just had dinner downstairs in the hotel. He dropped into the room's one easy chair and opened the first of the dossiers he had brought back with him from the office they had assigned to him at Project Headquarters.

The pattern of the Project had turned out to be a simple one of requiring reports and setting quotas for government

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offices that had already had a responsibility for getting goods produced to the requirements of the Aalaag. Nonetheless, it took Shane most of the next four days to read and comprehend it all. The dossiers on the staff members, whom he had met in person, held no particular surprises—including those on the three heads of staff.

Shane was used to finding at least a touch of self-interest obvious in almost all those who seemed to find authority comfortable under the Aalaag; and this was certainly so with two out of three in question.

The exception might be Walter Edwin Rymer, who had been a Captain in the English Air Force and had been drafted by the Aalaag for the Interior Guard because of his height. He was enough taller than Shane for Shane to be unable to guess that height closely but certainly Rymer was more than six feet four inches and most likely six feet six or better. Which raised a curiosity in Shane's mind. He had had a notion that the English military forces, like the U.S. ones, had maximum height limits as well as minimums for those who wore their uniforms. It had never occurred to him before, but most of those now in the Aalaag's Interior Guard must have been overheight for the military services of most large nations before the Aalaag came.

At any rate, Rymer had been given no choice about becoming an Interior Guard—although his rise in rank from Captain in that body to full Colonel in two years was suspiciously rapid for someone who did not find some reason for self-interest in his occupation.

Thomas James Aldwell and Jackson Orwell Wilson, on the other hand, had both effectively volunteered to work for their alien masters: Tom as a member of a Consultation Committee to the Aalaag, made up of former Members of Parliment—one of which Tom had been at the time of the Aalaag conquest—and Jack as a volunteer accountant, when the Aalaag had passed down through that same Consultation Committee a requirement for members of that profession to work in the human administrative units they were setting up.

Not only had both men volunteered —although there could always have been good and unselfish reasons for that—but both had, like Rymer, since swiftly risen in rank and importance under the Aalaag. The pattern of their lives in the brief time since the Aalaag had come, in other words, agreed well with the ambition that Shane felt both had betrayed to him when they had met.

He settled down now to reread both their dossiers. He had discovered that in his case multiple readings of such documents tended to generate either conclusions or inspired guesses, which more often than not later helped to fill out the picture of the individuals concerned. He was a third of the way through Tom's dossier, when a faint rustle of paper made him raise his head and surprise another note being shoved under his hotel room door.

He threw the dossier on to the soft surface of the bed, jumped noiselessly to his feet and took three long, silent steps to the door, jerking it open as he reached it.

But he was too late. The corridor without was empty of any sign of life. He bent, picked up the note that had just

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been left, closed the door, and went back to his easy chair to read it.

"Trafalgar Square. nine PM." this one said.

He was at Trafalgar Square at the appointed time. It was a cold night but not wet, for which he was thankful—an umbrella went awkwardly with his pilgrim garb; and he did not want to advertise himself by the fact that, thanks to a minor touch of Aalaag technology, his particular robe would shed any rain falling on it.

No particular meeting point in Trafalgar Square had been specified by the note, so to avoid whatever notice he would attract by obviously standing still and waiting, he began to stroll around the circumference of the Square. He was less than a third of the way around when Peter appeared and joined him.

"This way," said Peter, leading him away from the Square. A minute later, a car pulled to the curb beside them, stopped, and a back door was opened. Peter pushed him in and followed. The door closed, the car took off.

"Why in Christ's name," snapped Shane, once they were under way, "didn't you just call me, instead of going through this cloak and dagger routine of slipping notes under hotel doors?"

"Your phone might be bugged," said Peter.

Shane burst into laughter.

"I mean it," said Peter, angry in his turn. "That Interior Guard unit you've got working with you would only have to pass the word to the proper branch of the police here to have a phone tapped; and of all the easy phones to tap one in a hotel room leads the list."

"You don't understand," said Shane, sobering. "The Interior Guard at the Project might be ready to give anything you could name to tap my phone; but its commander—a Colonel named Walter Rymer, by the way, I've met him—would have to know better than to try. Anything he did, Laa Ehon would eventually be responsible for; and not only wouldn't the Aalaag think in terms of such spying, it would be a direct insult by Laa Ehon to Lyt Ahn. In effect, it would be Laa Ehon spying upon Lyt Ahn. I explained to you that they just don't violate their own laws, rules, and mores. They die first."

"How can you be so sure your Colonel Rymer knows that?"

"If he's been an officer in the Interior Guard for two years—and he has," said Shane, "he's learned the first rule of survival as a kept beast: never to do anything that might be construed as interfering between two Aalaag. He knows, all right. You can call me at that hotel room safely, any time you want to. I'm in no danger."

Peter was quiet for a long moment.

"I think," he said, in a lower, calmer voice, "you may be forgetting something. It may be all right for you to ignore what other humans, and other human organizations, can do to you, but the rest of us aren't in your position as a servant of the First Captain, or of any alien, for that matter. Maybe you've forgotten, but nowadays the human police forces are committed to enforcing the Aalaag laws, and that makes us in the Resistance fair game for any London police officer who has reason to suspect we are what we are. Maybe you can forget that fact. We can't."

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Shane found himself unexpectedly ashamed.

"I'm sorry," he said. "I am sorry. I do forget what it's like to be without the protection of my master."

"And I wish," said Peter, angry once more, "you wouldn't keep referring to them as masters, and particularly to Lyt Ahn as your master. It's that very attitude we're fighting."

"That," answered Shane a little grimly, "I won't apologize for. You can't take time to tailor your speech when you live cheek to cheek with the Aalaag. You have to think the right way, so that when you're required to answer with no time to think, you say the right things. But since we're getting into mutual irritations, how about you and the rest calling them by their real name, instead of always refering to them as 'aliens' as if they were something just landed from outer space, dripping slime?"

"It's not an easy name to say."

"Try it anyway."

"Lull . . . ull . . ." Peter tried to get the second syllable properly into the back of his throat, gargled, and then literally gagged with the effort.

"All right," said Shane, soberly. "I stand corrected a second time. But a native English speaker should have the easiest time with it. I can teach you how to say it—or rather approximate it—if you're willing to practice; and it may help you someday to be able to say it properly. The Aalaag tend to rate the intelligence of humans according to how they're able to speak the Aalaag tongue; and to value the humans according to their intelligence—which to them means trainability. Let's forget all that for now, though. What did you want to see me about? Have you heard from the Resistance leaders on the continent, any of them?"

"Just from Anna ten Drinke in Amsterdam. She'll come," said Peter. "There really hasn't been time to get an answer back from the others."

"All right," said Shane, "but I'll remind you I've probably got no more than a couple of weeks before I'll be getting orders to move on."

And with those words, they went their separate ways.

"Beast," said Laa Ehon to Shane, six days later, "you have now had more than ten days in which to observe the cattle at work on this Project. Give me your report on them."

Shane stood before Laa Ehon's desk. He was not quite standing at attention, but there was a large difference between this situation and the more relaxed conditions under which he normally reported to Lyt Ahn.

As usual, whenever he had to deal with an Aalaag, there had been that first rush of fear, escalating swiftly to a tension so tight that all emotion was lost in the intense concentration of giving answers that would be at once satisfactory and safe. He had thought in the past that what he felt at these times must be something like what a highwire artist in a circus must go through just before, and once he had stepped upon, the thin, taut strand of metal on which his support and his life depended.

"When I arrived here," Shane answered, "there were twenty-five cattle on the staff of this Project. That number has since increased to thirty-two—"

"You need not tell me what I already

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know," interrupted Laa Ehon. "I'm interested in your opinion of these beasts, only."

"I am corrected, immaculate sir," said Shane. "My opinion of those who have joined the staff since my arrival lacks the benefit of the time I have been able to give to observing those who were here when I came. Nonetheless, all seem intelligent and trainable, some more so than others, of course, but all of a level of competency which seems to be adequate to the tasks at which they are set or about to be set."

"I expected no less," said Laa Ehon. "Are there any in which you find possible weaknesses or inadequacies which might prove a source of problems, later?"

"I have observed none, immaculate sir," said Shane. "This is not to say that such may not exist in certain cases. There are two possible sources of future problems that might be mentioned to the immaculate sir. Since the Project is so new and the staff has been together such a short time, it has not yet had time—"

He hesitated.

"Why do you not go on?" said Laa Ehon.

"I am searching for a word to describe something to the immaculate sir, since it is a characteristic of us cattle which the true race does not have and I know of no word for it in the true tongue."

"I understand," said Laa Ehon, surprisingly. "Take your time and describe it as best you can."

"One of the characteristics of us cattle," said Shane, is that our relationships one with the other change over a period of acquaintanceship—"

"There is indeed a word in the true tongue which describes such a process," said Laa Ehon. "It is a rare word, seldom used. Nonetheless, I am interested to find that one of Lyt Ahn's celebrated translators lacks knowledge of it. The word is—"

The sounds he gave Shane, Shane translated in his own mind into the term "familiarity."

"I thank the immaculate sir. They lack, then, 'familiarity,' which will build as time passes and they spend more of it working with each other. This familiarity may improve their working together, or in some cases, it may impede it. Only time will tell. But if I am to estimate which, I would say that my belief is that generally it will improve this group of cattle, although in a body of this number, it is almost inevitable that one or several individuals might later turn out to be beasts better replaced by others."

"Good," said Laa Ehon. "That, now, is the sort of information I want from you. Since I expressed my interest in the fact you did not know the term 'familiarity,' I will also mention that I am also interested—favorably—in the correctness with which you pronounce it, after having heard it only once from me. So, at present the staff is satisfactory—as far as you can ascertain at this time—but as familiarity takes place within it, some beasts may need to be replaced. But you mentioned a second possible source of future problems."

"Yes, immaculate sir. The second is that we cattle are prone to a weakness which those of the true race do not share. It is that, given authority and over a period of time becoming accustomed

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to having it, the temptation may occasionally occur to one individual beast or another to overuse that authority; perhaps even to put it to work to satisfy some personal desire or protect it against a work-failure on its own part being discovered by the cattle in authority over it, or even by one of the true race. But again, this is something that it will be necessary to wait on time to find out."

"I find what you say interesting indeed," said Laa Ehon. "I am pleased with your lack of hesitation in telling me of possible flaws in the staff members which would be the product of flaws you freely admit are common to your kind. I am to assume, am I not, that you also share the possibility of being hampered by these flaws?"

"I am obligated to admit so, immaculate sir," said Shane. "However, my lot has been cast as a servant of one of the true race and I find in the true race much of what I would like to find in myself. To yield to such flaws as I have described would put me beyond achieving an imitation of what I have seen in those of immaculate and untarnished nature. Therefore I am very unlikely to find myself tempted to so yield."

There was a slight pause.

"For a beast," said Laa Ehon, "you speak with unusual boldness in saying you desire to model your conduct on that of the true race. I would caution you, in speaking to me, that you do not allow that boldness to be confused with license to go beyond what should properly be said by one of the cattle to one of the true race."

Back to Shane's mind came the junior Aalaag officer at Laa Ehon's Headquarters in Milan saying: "—I am not one of those who allows his beasts to fawn on him . . ."

"I will remember the words of the immaculate sir and keep them in mind at all times henceforward," said Shane.

"Good. Now, I am particularly interested in those three beasts who are in authority—Tom-beast, Walter-beast and Jack-beast. What have you, if anything, to report to me about them?"

"They seem singularly able, immaculate sir," said Shane. "Beyond this, the immaculate sir might find interest in the fact that Tom-beast in particular is unusually happy to have been given this work to do. He foresees a result of it in which we cattle may much more efficiently serve our masters."

"So that particular beast has given me to understand," said Laa Ehon.

He rose to his feet suddenly, towering over Shane, with only the width of the desk between them—a width that suddenly seemed to have shrunk.

"I leave immediately for my district of Milan," said Laa Ehon. "I will be gone at least three days and in that time Mela Ky will speak my words."

Shane's spirits leaped upwards. He had calculated during his trip to London that Laa Ehon, no matter what his interest in this Project, could not afford to be absent from his Milanese post of main responsibility for a full two weeks uninterrrupted. He had been waiting for word that the other would need to leave London, even if only for part of a day, listening to all the Aalaag conversation he could overhear, reading all Aalaag hard copy that he could come close enough to read. Still, it was not surprising he had not been able to find out the time of Laa Ehon's leaving until

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now. Laa Ehon himself might have made up his mind to go only a matter of a few hours or minutes before.

"This beast will listen to the untarnished sir Mela Ky in all things," he said.

"Good. You may go."

Shane went out. A little more than twenty minutes later, he saw Laa Ehon leave for his courier ship, which was kept in a cradle on the roof of their building; and fifteen minutes after that he was at the door in the basement that was the entrance to a room, the name of which translated from the Aalaag to a place that was both a museum and an arms locker.

There were three other Aalaag on the premises—the nucleus of the alien staff would come later. They were Mela Ky and two others. The three took shifts of being available for Laa Ehon's orders and running the Aalaag end of the office. Mela Ky, as senior officer and the commanding officer's direct assistant, took the main, daytime shift with Laa Ehon. The other two took, respectively, the evening and the early morning shift; so that at all times there was an Aalaag awake on the premises.

Right now, the one on duty was Mela Ky; but with Laa Ehon's leaving he was now in Laa Ehon's position of responsibility, which meant he had moved directly to his desk in the office he shared with his commanding officer the moment Laa Ehon had flown his courier ship out of the cradle overhead and up toward airlessness. The other two Aalaag would be in their rooms.

Shane made a tour of the premises to make sure that was indeed where they were. But it was so; and nothing to be suprised at. The Aalaag when off duty spent nearly all their time in their quarters. They seemed to have three primary activities besides work and exercise, of which they also did a great deal in their officially off-duty hours. The three activities were viewing scenes on their wall screens which seemed to be from the thousands of years past when they had lived on their native worlds—and this was close to being, if it was not in fact so, a religious exercise. Of the other two activities, one was sleeping—for the aliens apparently needed something like ten hours sleep out of the twenty-four; and the last was the playing of some incomprehensible game that could be two-handed or played by a single individual. It involved a screen set flat in the surface of a desk and a bank of lights that formed shapes both in the screen and in the air above it as controls were pressed by the players.

The two off duty would not be playing against each other now, however; because the one who would take the early morning shift would necessarily be sleeping in preparation for that. The other, left to himself, would be either viewing the past, working, or playing one-handed with the game screen in his room.

That meant that Shane had at least a fair chance of getting into the arms locker without being caught at it. Laa Ehon might have known that Lyt Ahn had supplied his human courier-translators with keys that opened most ordinary doors that were locked to those who were not Aalaag. It was almost certain, however, that his subordinates did not; unless he had specifically warned them of the fact—and there had been

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no reason to give them such a warning. Not only did crime not exist among the Aalaag; anything they considered of any importance—such as weapons—would not operate except when handled by an Aalaag.

Also, it was an almost inconceivable possibility that a beast might possess an Aalaag key. Only the unique nature of the duties to which the courier-translators were assigned, that made it occasionally necessary for them to use routes through Aalaag Headquarters and elsewhere that were normally restricted only to the aliens themselves, that had made keys available to such as Shane.

Facing the door of the arms locker —which looked like a simple slab of wood, but which he knew to be far more than that—Shane took the rectangle of soft gray metal that was the key from his pocket and touched the end he was not holding to the door.

It dissolved, first to a brown mist, then into nothingness, before him. He stepped through the opening that had appeared and looked back. The door was once again solid and closed behind him. He looked forward again.

The arms locker was more spacious than might have been suspected from the ordinary appearance of the door. It gave the impression of a large room carved out of white plastic or snow-colored rock, cut into innumerable niches and crannies, most of which held a single item as if it were on display. A soft, white light flooded the area, seeming to come from nowhere in particular but to be everywhere equally. Underfoot, the uncarpeted flooring was soft—softer than any floor of Aalaag construction that Shane had walked on, except in the arms locker at Lyt Ahn's Headquarters, which was a many-times larger duplicate of this place he found himself in now.

The single items, each displayed in its own niche, were all weapons. Every Aalaag had his personal weapons that were, in effect, heirlooms, having been passed down from generation to generation since the time they had been carried against those who had driven the Aalaag from their home worlds. Others, duplicates of these arms, were carried when ordinary use required, such as when mounting guard, either in a Headquarters or when on display or patrol of the Earth cities they had conquered.

The originals, these precious inheritances, were taken from their niches only for ceremonies of the highest importance, and immediately thereafter returned to them. Where the individual Aalaag went, his or her ancestral weapons went. They were seldom touched; but, like all arms possessed by the aliens, they were charged and ready for use at all times.

Still, they were symbolic rather than real. In the final essential, the only enemy the Aalaag really feared were the race that had dispossessed them of their original homes; and if that race should come this way, hand-weapons such as these would be of little use—like lighting matches in the face of a blizzard. But symbolically, they were everything.

Each of the four Aalaag connected with the Project had his private area in the arms locker. In the case of the three subordinate officers these were filled with all their weapons. In the case of Laa Ehon, by only a token few, since most of the commander's heirloom arms

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would be still in Milan. Shane, about to move toward the back of the locker, paused for a moment to gaze at the long arm—the weapon that was closest in likeness to a human rifle—that Laa Ehon would carry if he rode abroad on one of the alien riding beasts that to the aliens were almost as symbolic as the weapons. The long arm lay dark against the white nest that held its narrow, two-meter length.

He had seen such arms many times before. Not only were those like this one hung on the walls of Lyt Ahn's Headquarters, the House of Weapons, but he had also seen them in the arms locker there. He had even seen the equivalent long arm of Lyt Ahn, himself, on one of those occasions when he had been sent to fetch something from that arms locker. What he had been sent for had been something of small importance and non-military use, always. Humans—beasts—were never allowed to touch weapons. In fact, to do so incurred an automatic death penalty for such as Shane. Not because of the danger involved—for there was the fact that no weapon would discharge in the hands of any not an Aalaag—but because the touch of a lesser being was like a stain upon any such weapon.

For a second, Shane was swept by an overwhelming urge to lift Laa Ehon's long arm from its niche and hold it. A mixture of feelings had him in its grasp. Partly it was made up of defiance of the rule that said he should never touch such a thing. In part it was also a wild urge to test for himself the truth of the belief that the weapon would not work for a human like himself. But overlaying all this was a fascination of which he was half-ashamed but could not help feeling.

He had been, he discovered, around the Aalaag long enough to have become at least in some small part affected by the mystique about their weapons. Some buried part of him wished to hold the long arm, as a child or savage might yearn to hold an object reputed to possess great magic, to see if some of that magic and—face it—the courage and singlemindedness of the Aalaag, might not flow from it into him.

He made himself turn away without touching the long arm and went toward the back of the locker. As he went, he passed in turn each of the sections given to the cherished inherited weapons of each officer in this building, then passed the weapons for everyday use, racked all of one kind together since none of them had a specific owner. Finally he came to what he was searching for, the area that held what had brought him here. It was the section that held clothing and other lesser items, such as those he had been permitted to carry or fetch for Lyt Ahn in the House of Weapons.

These, a beast might touch. These, hopefully, would work for a beast. At least, some of them had, when he had been left alone in the arms locker at the House of Weapons long enough to try some of them out. He had had time then to experiment with nearly a couple of dozen items, picked at random; for they had been like adult toys in the sorcerous results they produced when properly activated . . . and yet they were nothing but the simplest of everyday tools to the Aalaag.

The first item he searched for now was a device that would lift him up the clock tower at the north end of the Houses of Parliament, to the face of Big

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Ben itself, the clock there; and after a moment he did find such an item, an exact duplicate of the one he had experimented with in the House of Weapons arms locker. It was a ring made for an Aalaag finger, which made it far too big for both his thumbs placed together, with a smaller ring which could be slid around it.

He put the device loosely on his middle finger, held it there by closing his fist and slowly tried sliding the smaller ring a tiny distance around the curve of the larger. For a second it seemed that he felt no difference, and then he was aware that his feet were not pressing upon the floor with the weight they had pressed before. Cautiously, he moved the smaller, controlling ring farther, and felt himself float free of the floor entirely and start to ascend ceilingward. Hastily, he pushed the controlling ring back to its original position and put the device in the right-hand pocket of his pants.

To locate the next item he remembered from the House of Weapons arms locker—what the Aalaag called a "privacy tool"—required a longer search. He was on the point of giving up when eventually he found it. It was a thin box shape apparently of metal and as large as his hand. In this case, a sliding stud was set in the center of one of the larger faces of the box. Once more he cautiously advanced the control stud, while holding the device.

For a moment, again, he thought that nothing had happened. Then, anxiously looking down at the lower part of his body, he saw only floor, though looked at closely it could be seen to be slightly distorted by what might be the kind of distortion of air movements produced by heat waves on a blisteringly hot day. Nonetheless, with the privacy tool he had a practical invisibility when he might need it. He sighed with relief, returned the control to its original position and put this into his jacket pocket. It made a noticeable bulge there; and, after a moment, he changed it instead to his left pants' pocket. Here it also bulged, but the overhang of his jacket disguised the sharp outlines of its shape as seen through the cloth.

Hastily, he used his key again and left the arms locker, with its door apparently undisturbed behind him. His intention was to get away from the building as quickly as possible. It was already the time at which he had promised to meet and have a final talk with Peter, privately, at dinner in a restaurant.

But as he was reaching for the front door, the Interior Guardsman on duty at the desk in the lobby checked him with a message.

"Governor said to tell you he'd like to see you," said the guard.

Shane hesitated, thinking of the bulges in his pockets; and then decided that he could brazen out any curiosity about them by standing on his rights as an independent observer of the Project. He turned and went back, up the stairs and to the office of Tom Aldwell.

He found all three of them—Aldwell behind his desk, Rymer and the assistant governor, Jack Wilson, in easy chairs facing him. They made pleased noises at seeing him and Jack brought forward a similar chair, so that he found himself seated as part of their circle.

"We've been saying how well things

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have been going," said Tom, beaming at him. "It'll be interesting to see how much Laa Ehon is actually required, how much we miss him during the few days he's gone. My guess is that it's going to be little."

"Very little," said Jack.

"Or not at all," put in Rymer.

Shane looked around at their faces.

"His job's only to see that you do your job," he said. "I wouldn't expect he'd be needed, as you put it. The guard on the front door said you were looking to talk to me, Tom."

"Oh, that." Tom waved a hand. "Nothing too important. It's just that we understand you were talking to Laa Ehon about us just before he left, just now."

"What gives you that idea?" Shane asked.

"Well . . ." Tom touched a button inset in a panel of such buttons on the top of his desk. Instantly, the sound of two speakers conversing in Aalaag filled the office. One voice was that of an Aalaag, the other was that of a human speaking the alien language—Shane's voice.

Shane exploded out of his chair.

"Are you insane?" he shouted at Tom. "Shut that off!"

Tom smiled indulgently, but reached out and touched the button. The sound of the voices ceased abruptly. Shane sank back in his chair.

"Haven't you learned anything about the Aalaag?" he said. He turned to Rymer. "Walt, you at least ought to know what it means to bug any room belonging to one of the masters!"

"Calm yourself," said Rymer, harshly, "we haven't bugged anything. This place used to belong to one of those African consulates and they had it wired from basement to attic. We didn't do a thing but find their system, chart it, and hook into it here and there."

"Do you think that makes any difference?" Shane blazed at him. "It's the intent to overhear that'll hang you on the hooks if the Aalaag find out."

"No reason why they should find out," said Tom. "In any case, this use of it was more or less an experiment. If you feel that strongly about it, we won't do it any more. It's merely interesting that we should have happened to overhear you talking to Laa Ehon about the three of us."

"Happen" was undoubtedly not the word, thought Shane grimly; but there was no point in pursuing that now. And to think that he had spoken with such assurance to Peter about the local police or Interior Guard not daring to bug the phone conversation of a servant of the Aalaag like himself; and here they had actually gone and secretly recorded their own master in conversation. It just showed that it paid to remember that there were always idiots who would dare any chances.

"Interesting?" he said. "Why?"

"Well, one always likes to know what's being said about one," said Tom, spreading his hands on the desk top reasonably, "and as you know, we weren't able to understand what was being said—just recognize the sound of our own names when they came up in conversation. We hoped you could tell us what you and our alien master had to say about us."

"No," said Shane. "I could, but I won't. That'd make me almost as guilty

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as the rest of you for listening. Forget there ever was a conversation of that kind—and destroy that recording."

"You may not be willing to admit what you said," spoke up Jack, "and perhaps the three of us here can't understand it, but there're linguists not owned by the aliens who may not be able to speak the lingo, but given time to work with that tape could do a pretty good job of puzzling out what was said."

"No, no," said Tom, hastily, "Shane, here, knows the aliens much better than we do. We'll destroy the tape and forget all about the conversation. You see to that, Jack. I can count on you to take care of the tape, can't I?"

"If you say so, Tom," said Jack.

"In any case," Tom went on, "we all know Shane well enough to know that he wouldn't say anything to our discredit—unless of course there was something to our discredit to say—"

He broke into a smile which included them all.

"And I, for one, don't believe there is," he wound up. He held up a hand. "No, Shane, and I'm not asking for a hint from you as to how you talked about us. I have full trust in your good sense and honesty."

"Thanks," said Shane.

"No need for thanks. Now—on another subject. It seems we're about to get one of your co-workers as permanent translator attached to this Project and on loan from Lyt Ahn. A man named Hjalmar Jansen. He's due in tomorrow. I thought you could perhaps give us some idea of what he's like and what he'd prefer in working with us—just any information you feel free to give, information in confidence, of course."

Shane had become too schooled at hiding his feelings in the past couple of years to raise his eyebrows at the name of Hjalmar Jansen. It was not that out of the whole translator corps there were not more unlikely choices; it was simply the irony involved in the choice of Hjalmar. He was a big young man—big enough to have qualified for the Interior Guard, if it had not been that his linguistic skills were so much more valuable; and powerful in proportion to his size—but so mild and soft of manner that some people got an impression of him as being almost boneless. The irony lay in the fact that under that extraordinarily soft exterior he was probably the most stubborn human being that Shane had ever met. Once Hjalmar had made up his mind about something there was no point in discussing it with him, because he simply did not hear you. It would be interesting to see how he and Tom would rub along together.

"Hjalmar's about my age," said Shane. "Swedish, originally, and a very good linquist—good with Aalaag, also. He's pleasant, easy to get along with—" mentally, Shane crossed his fingers behind his back—"and you'll find him something more of a drinker than I am."

"How very nice!" said Tom. "I don't mean that he should prefer the fleshpots more than you do, Shane. It's just that it's pleasant to hear a good report of someone we're going to be working with so closely. Well—look, we won't keep you. I apologize for asking you about what you said about us to Laa Ehon; and, don't worry, we'll destroy the tape of the conversation you heard."

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"Right, then." Shane got to his feet. "It's time I was on my way back to my hotel room. I'll see you all tomorrow."

"Certainly, certainly," said Tom and the other two murmurred agreement.

Shane went out. So they'd destroy the tape, would they? he thought to himself. Like hell they would!

He left the building and a few blocks away from it caught a taxi giving it the address, not of his hotel, but of the Indian restaurant at which he had arranged to meet Peter at this time.

The restaurant was a dim little place, for which Shane was thankful, for he was not wearing his pilgrim robe with the concealing hood. He was aware that Peter had in effect hitched his wagon to the hopes which Shane offered the Resistance, from the moment the Resistance leader had invited Shane to get back in touch with him; and everything since then, particularly this summoning of other leaders from the Continent, had tied Peter's chances of success and his personal reputation that much more firmly to Shane's. In this case, Shane had impressed on him the fact that they must meet someplace where other Resistance people would not go, lest one of them, recognizing Peter, take note and later be able to identify Shane.

Peter, Shane knew, would have done his best to see that this was so. Chance — bad luck—however was always to be reckoned with. So he glanced swiftly around the other tables—the place was about half-filled—to see if anyone was paying any attention to Peter, seated alone and waiting in a secluded corner, then went to Peter's table and seated himself in a chair with his back to the room.

"Been here long?" Shane asked, quietly, as he sat down.

"Since the place opened for dinner," said Peter. "I've watched everybody who came in. There's no one I know, and therefore there oughtn't to be anyone who knows me."

"Good," said Shane. He picked up the menu on the plate before him and glanced at it. "I'll have the curried lamb. You do all the ordering."

Peter ordered drinks.

"What's the latest count of people who've shown up from across the Channel?" Shane asked.

"Eight," said Peter. "Anna ten Drinke came in from Amsterdam and Julio Marrotta from Milan. Albert Desoules of Paris was already here, and Wilhelm Herner, so we've got the big four."

"I'm suprised at ten Drinke and Marrotta," Shane said. "Amsterdam's so close and Marotta must know about what I did there. I'd have thought they'd have been among the first to show up. Does it mean anything, do you suppose, that they took this long to come?"

"Not that I can imagine—and not necessarily, in any case," said Peter. "Some of the less well known names might have come just for the trip to London—it made a good excuse. Marrotta and ten Drinke don't need excuses. No more do Desoules and Herner, so they probably decided to take as short a time off from ordinary business as they could get away with."

"I see," said Shane.

"By the way," said Peter, "they're growing impatient—understandably so — to meet you, now they're here. I've told them about the new Governor Project and your connection with it, and

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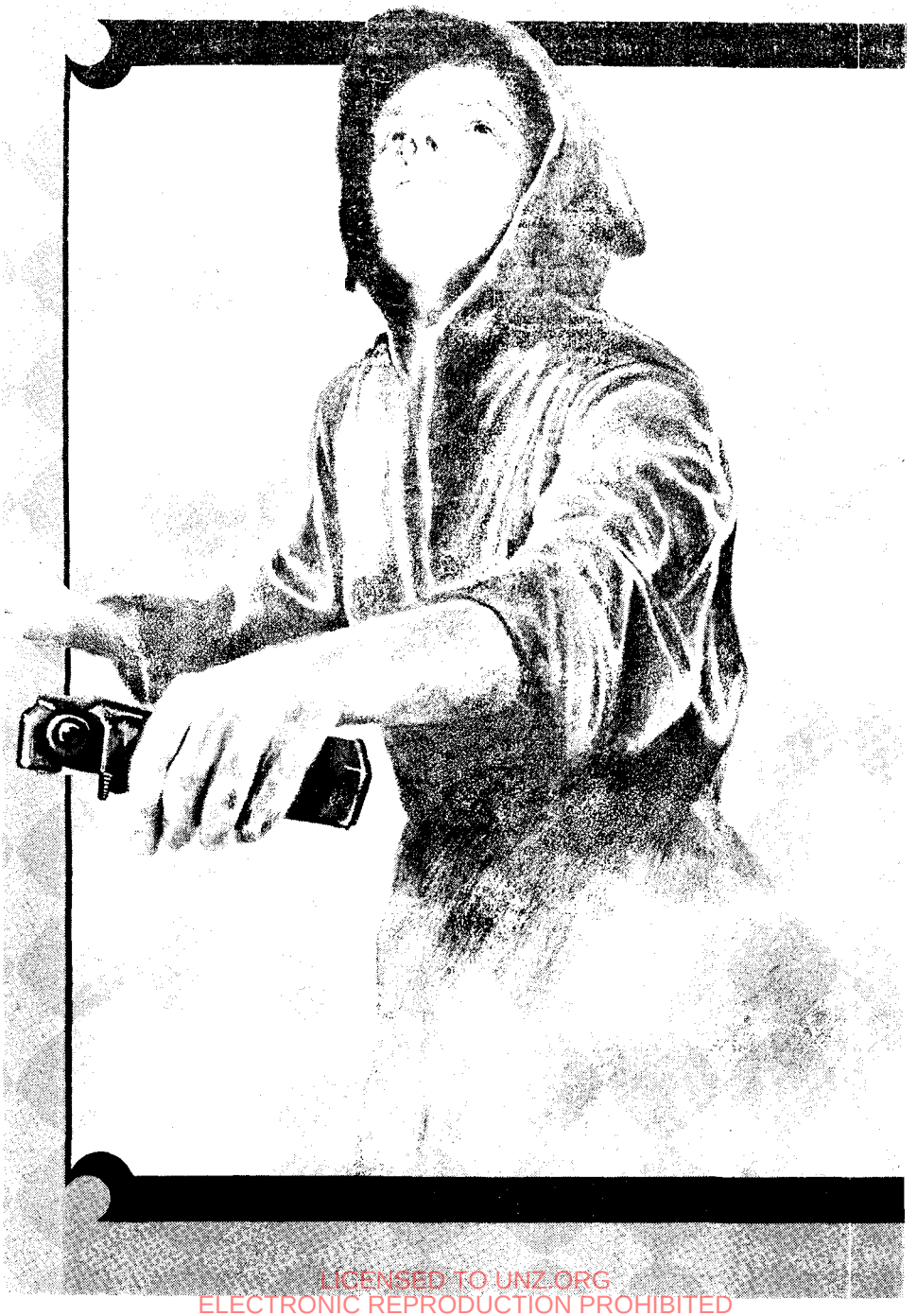

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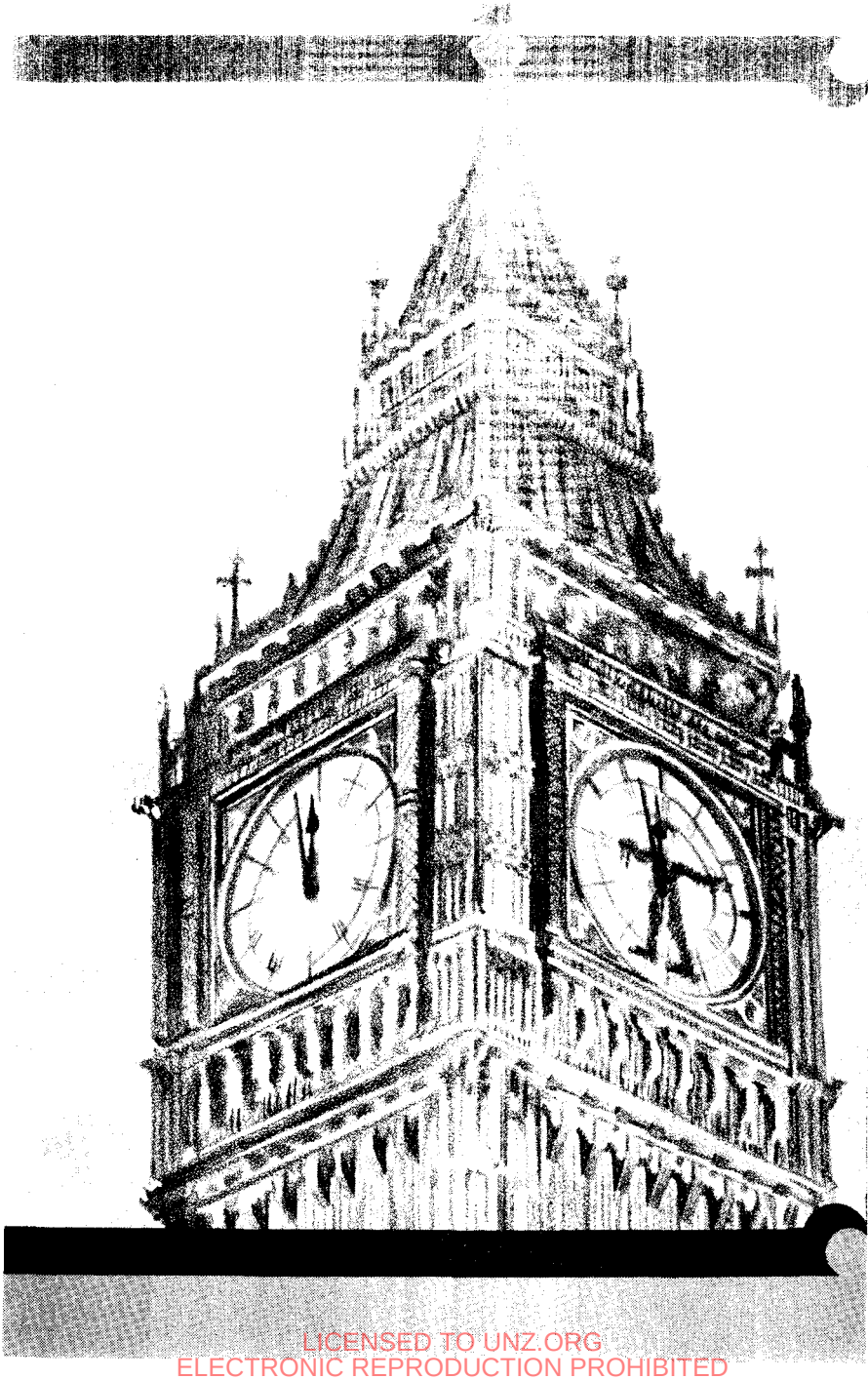

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given them the idea that it wasn't easy for you to get away safely from it, and that's what's been holding you back from meeting them. But they're getting restless, just the same."

"They can see me tomorrow afternoon—" Shane stopped himself as a waitress came to their table and Peter put in their orders. "In fact, it's most important they see me tomorrow. But they won't be able to talk to me, just see me, until evening."

Peter stared across the table at him in the dim light.

"What do you mean?"

"I mean that in the day I'm going to put on a show for them in a public place; and I want you to see they're there to take it all in. But they mustn't make any attempt to speak to me there, or get close to me."

"Oh, Lord!" said Peter. "Now what? And why couldn't you have told me something about this in advance?"

"I said it before, and no doubt I'll have to say it again, although someone in something called the Resistance like yourself ought to understand without my saying anything. The less anyone—and I mean anyone, even you—knows about what I'm going to do the better. When you need to know, I'll tell you. I'm telling you now."

"All right, then. What is it?"

"I want you to get all these visitors into positions—separate positions—close to the Houses of Parliament, so that they've got as close a view as is safe of Big Ben at just a little after noontime, tomorrow. There's an Aalaag on his riding beast always on duty around the Houses of Parliament—"

"I know," interrupted Peter.

"I know you know," said Shane. "I'm trying to tell you something. Please listen. He rides from position to position around the building, sits his riding beast a short while at each position, then moves on. He usually stops just before the clock tower at noon, or a little after. Tell your people that when they see him ride into position there and stop, to start watching the face of Big Ben. They may have to wait some minutes before they see anything, but they're to keep their eyes on the clock face until they do, or they'll miss what I want them to see."

"And what is it they're going to see?" demanded Peter.

"You'll find that out when they do. I want you on the scene, too; but in your case, you'll be standing out about twenty yards beyond the Aalaag on his riding beast; and you'll have a car either parked, or driving around close enough by so that you can get me into it and away in the shortest possible time—"

"Look here!" said Peter, suddenly, "your idea's not to blow up the clock tower or damage Big Ben some way—"

"No, damn it! Now, will you just listen?" Shane snapped the words at him in an angry whisper as the waitress began to approach their table with filled plates. He stopped speaking until she had gone again, then picked up where he had left off.

"I want you standing by ready to guide me to that car, or to where it can pick me up. Our visitors who're observing will have to see to getting themselves out of the area and meeting us somewhere else later. I'll be wearing my pilgrim outfit, of course, with the hood hooked shut in front. I suppose

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you've warned them about the fact I've got to preserve my anonymity; and they've agreed to go along with that?"

Peter nodded.

"But I need to know something more myself about what you're planning to do," Peter said. "What if something goes wrong with whatever you've got in mind? I've got to be ready to change my own plans and the orders to this car you want waiting."

"You don't need to know any more; and you're not going to," said Shane grimly. "I'll leave it up to your good judgement at the time, tomorrow. If the point comes where you think I can't be safely helped by you, then get out—any way you can."

"Better eat your curried lamb," said Peter. He himself had been eating between his own words, while Shane's plate had sat untouched on the table in front of him.

Shane grunted and, picking up his knife and fork, got busy with the food before him.

"I'll meet them all that night," he said between mouthfuls, "after they've seen the demonstration. You can tell them that. You pick the place to meet, and send a driver for me. Did you change those gold pieces I gave you into ordinary money for me?"

Without a word, Peter reached into his inside coat picket and took out an envelope which he handed to Shane.

"Thanks," said Shane. "The gold's useful sometimes, but most of the time, here, now, I'd rather not attract attention to myself; and after tomorrow, I particularly won't want to attract attention to myself when I'm wearing the pilgrim robe."

"And I take it I'll understand just why, after tomorrow noon," said Peter drily.

"You take it right," said Shane.

They talked of nothing more that had to do with tomorrow during their meal together. Shane did not offer any more information and Peter did not ask questions, for which Shane was grateful. He was coming to like Peter, although he did his best to hide it. More and more he was convinced of the wisdom of his first reaction on seeing those Resistance people which Peter had got together to meet him on his first arrival in London. It would be much safer to be disliked than liked by those he met who had dedicated themselves to fighting against the Aalaag. To say nothing of the fact that it would help his conscience to sleep nights.

The next day he was at the Project early and set himself up in the office that had been assigned to him, strewing the desk top with papers and building as complete as possible a picture of being immersed in some large piece of work. Just after eleven in the morning, he waited until there was no sound of anyone coming and going in the corridor outside his door, then took off his shoes, put on his robe and opened the door enough to let him look out.

The corridor was deserted.

Carrying his shoes in his right hand, he reached in through a slit in his robe to the left side pocket of the jacket he was wearing underneath, and touched the stud on the privacy tool. Now invisible he slipped out, into the corridor, heading toward the stairs and the front door.

His office was on the third floor. He

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made it to the stairs and down them without a sound and without encountering anyone. An Interior Guard corporal sat at the desk by the front door with the sign-out book open on the table in front of him and a pen handy. But in the relative dimness of the building's interior even the illusion of heat waves in still air was not visible. He did not even glance up as Shane slipped by him.

At the door, however, Shane was forced to wait. He stepped back into a dimmer corner of the lobby beside the door and composed himself to patience. The minutes slipped by and nothing happened. Then, so suddenly it was almost like an explosion on the quiet of the lobby, came the sound of shoes briskly ascending the steps outside to the door, the door was flung open and a young, blond-headed staff-member named Julian Ammerseth came in carrying a large manila envelope under his arm.

"Back again—" he said cheerfully to the corporal, approaching the desk to sign in; but that was all Shane heard, for he had caught the door from closing with an invisible hand behind the other's back and slipped through to the outside.

He paused just at the bottom of the outside steps to put his shoes on; but he kept himself invisible until he was well away from the Project headquarters and could find a niche of an alleyway not overlooked by windows, into which he could step long enough to let himself become visible again.

Visible, he pinched the hood of his robe together, and continued down the street on foot until he could hire a cab and have it take him within a few blocks of the Houses of Parliament.

It was fortunate he had allowed himself some extra time. It took him some minutes to walk around the Parliament buildings until he had found the Aalaag sentry and made sure that he was more or less on his regular schedule, which should put him before the clock tower at noon or shortly thereafter. The actual time of his arrival there could only be guessed at, since the officer—it was a male, this time, Shane noted from the armor shape—would ride to a point, sit there a while, then ride on to another point at which he would pause; and both points and length of pause were apparently chosen at random.

Having found the alien, he returned to the base of the clock tower. The time was seven minutes to twelve. There was no lack of people going to and fro, or standing and talking to each other in the walks on this side of the tower. He did not see Peter; and the Resistance leaders from the continent, of course, were unrecognizable by him. He continued around a corner of the tower, hunting for a place where he could safely turn himself invisible. But there was none.

In desperation, he settled for a moment when none of those around him seemed to be looking in his direction and pushed over the stud of the privacy tool in his left jacket pocket. Invisible, he returned to the tower below the clock, activated the ring-device, and let its powers lift him slowly up the face of the tower to the clock.

He had not taken into account the effect of apparently standing in mid-air on nothing, some stories off the ground. He was not ordinarily affected by heights, but now he had to fight down an irrational feeling of panic that began to rise

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in him as he himself ascended toward the clock face.

He reached it; and, playing with the ring device, managed to halt himself opposite the hub from which the two hands of the clock were pivoted. He looked down. The Aalaag was nowhere in sight.

Invisible, suspended in air, he waited and scanned the walks below for some sign of Peter. At just two minutes to twelve, he located him, standing in apparent conversation with a short, round-hatted man at the distance Shane had told him to be beyond the Aalaag.

Time slowly passed. The minute hand of the clock was so large that by watching it, he could see the slow creep of its tip around the dial. It reached noon and the Aalaag had not yet appeared. It moved on, past five minutes after twelve, past ten minutes after twelve . . .

At a little more than fourteen minutes after twelve, the massive figure in shining armor rode its huge, bullike beast around a corner of the tower, and moved to a position roughly opposite the middle of it before stopping. To Shane's relief, the rider had brought his beast to a halt facing outward so that he, too, looked away from the clock. Shane reached a perspiration-slippery hand in through the slit on the left side of his robe and turned off his invisibility.

Looking down he saw his robe and shoes, brown against the white face of the clock. Within him the urge was overwhelming to make his mark upon the clock face and start his descent; but he had calculated beforehand that he would have to hold a visible position where he was for at least sixty seconds, to make sure everyone who should be watching for him had noticed him; and as many others, except the Aalaag, as possible. He hung there, accordingly, with the sweat rolling down his body under the robe and waited for the huge minute hand to move forward one full minute.

Finally it touched the black mark toward which it had been progressing. Shane reached in under his robe and brought out a stoppered vial of black paint and an inch-wide paintbrush. He poured the black paint on to the brush and applied the brush end to the clock face beside him, making the sketch of the cloaked figure with staff in hand. Then he put vial and paintbrush back in under the robe, heedless of what the paint would do to the jacket he was wearing there, and touched the ring device to let himself begin a slow drift down the face of the tower.

Out beyond him, on the ground, he could see faces, a number of faces now, turned up to watch him. At any moment he expected the Aalaag also to turn, to see what was attracting the attention of the humans. He had counted on the Aalaag indifference to beasts to cause this one to ignore the curiosity of the surrounding people as something beneath the notice of a master.

But this was no certainty; and, sure enough, before he had reached the ground, the riding beast swung about, on some signal from its rider, and that rider looked directly up at Shane.

Within the shining helmet was only the slit through which the officer looked out. Shane could not see the Aalaag eyes within that slit, but he could feel them focusing on him. Holding his face and body as naturally as possible, he reached the ground and began to walk directly toward the alien.

He came closer and closer to the great pair of figures, reached them, and

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stepped past them, without either increasing or decreasing his pace. Still at the same ordinary walk, he started toward Peter, whom he could see standing —now alone—where he had been told to stand and wait.

At any moment, Shane expected to hear the deep Aalaag voice behind him, commanding him to halt—or feel the sudden stunning blow of the officer's long arm without warning, on the sentinel's theory that a beast like himself would not understand even a simple order in Aalaag to stop. Step followed step. Peter became closer and closer. Just before Shane reached him, Peter turned and began to move away, walking some ten feet before Shane.

Shane followed him.

Behind him he had no idea what was happening. But none of the humans he neared spoke to him or turned toward him, although every one of those he passed in the first minute or so glanced, surreptitiously or otherwise, at him as he went by. He continued following Peter until they turned a corner and were passed by a group of some four or five men moving in the opposite direction, and who blocked them from the view of those by the tower, but paid no attention to either of them, lost in animated conversation as they walked.

Peter glanced back over his shoulder briefly, then nodded and beckoned. He sped up, his walk becoming a very fast walk indeed. Shane speeded up to stay with him. They were moving alongside a street, now, down which there was a flow of traffic; and a moment later a car pulled to the curb just ahead of them.

Peter reached it first, opened the door for him, and stood aside. Shane ducked in. Peter followed. The door slammed and the car accelerated away from the curb once more. A moment later they were lost in traffic.

But, as he sat silently next to Peter while the cars closed around them, an elation began to build amost reasonlessly within him. The Pilgrim had made an appearance—not only that, but as the Pilgrim he had walked right up under the nose of the Aalaag on guard, while at least some of the heads of European Resistance watched. The excitement he was feeling was out of all key with reality. He had to reassure himself that in a real sense he had done nothing but put on a show. It was all a sham, a farce put on to help him make himself safe from his association with these ridiculous Resistance fighters—and possibly make safe as well Maria, the woman he had saved in Milan, if he could get her loose from her Resistance loyalties. In the end, what he had done this day would mean nothing—it was only a step bringing them all closer to the moment when he must betray Peter and others like him to the Aalaag.

Not only that, but he was returning now to face Lyt Ahn; and if he had learned to know the First Captain over these past two years, the First Captain had also learned to know his favorite translator-beast. If any Aalaag could read the signs of a guilty secret hidden in Shane, it would be Lyt Ahn—and Shane reminded himself once more, as he did daily if not hourly, that the way to survival in the world as it now was, depended on never underestimating the Aalaag.

Yet, still, in spite of all this, why did he persist in feeling so wildly triumphant? And then he understood: he had committed himself—and that was a good feeling. ■

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on gaming

Dana Lombardy

ICON: Quest for the Ring ($49.95 at your local store, or direct from Macrocom Inc., Box 70012, Marietta, GA 30007) is a fantasy computer game for use on the IBM PC and compatible machines. A combination of text adventure and arcade action, *ICON* features fine graphics and subtle clues.

The Ring of this quest is not Tolkien's famous magic jewelry, but the Ring of the Rhinemaidens, immortalized in Wagner's opera *The Ring*. The game is primarily an adventure of discovery and exploration using Wagner's story as the backdrop. Game action is fast, furious, and visual, but the character you play in the game grows in strength and skill from careful reading of the text for clues to what is required of your character.

To win, you must achieve the goal of the quest, and that is deduced in the course of play. Essential to satisfying the requirements of the quest is locating icons, mystical symbols usually of a religious nature. These icons represent virtues such as Perseverence and Duty. They are hidden within a dungeon maze and you must locate them by moving your character through the maze while avoiding or defeating monsters and creatures that can "kill" your character.

Even if an icon is found, however, its power is not necessarily available to you. Before an icon can be claimed, your character must be aligned with the virtue the icon represents. If you attempt to touch an icon before satisfying its demands, death is instantaneous.

Clues as to how to align with the different icons of each of the seven levels of the dungeon are found in the short text that introduces each level. The key word here is "clues."

Once you think you've got the clues, you're ready to start the action on that level. Your character begins in a room in a maze of corridors and chambers. You must move quickly to pick up weapons such as swords and magic wands, protective armor, and shield before the numerous bats, rats, ghost, alligators, and kobolds attack you.

As you progress through the mazes, you will encounter a variety of adversaries and find a variety of objects that will improve your life expectancy. New weapons, bars of gold, healing runes, and other items can be picked up as you go along. Of course, you have to use the wands to find out what they do and using the wrong one for a given situation can be fatal.

The gold bars may seem a superfluous addition to the game, but these caverns are the home of the Niebelungen, the dwarf miners who are surly, tough fighters—and greedy. They steal your gold bars when encountered. But if you don't have any gold bars on you, they become very angry and hack you to pieces with their axes. Too many gold bars, however, can prove disasterous when you attempt to cross an underground river.

(continued on page 123)

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PARKING SPACES

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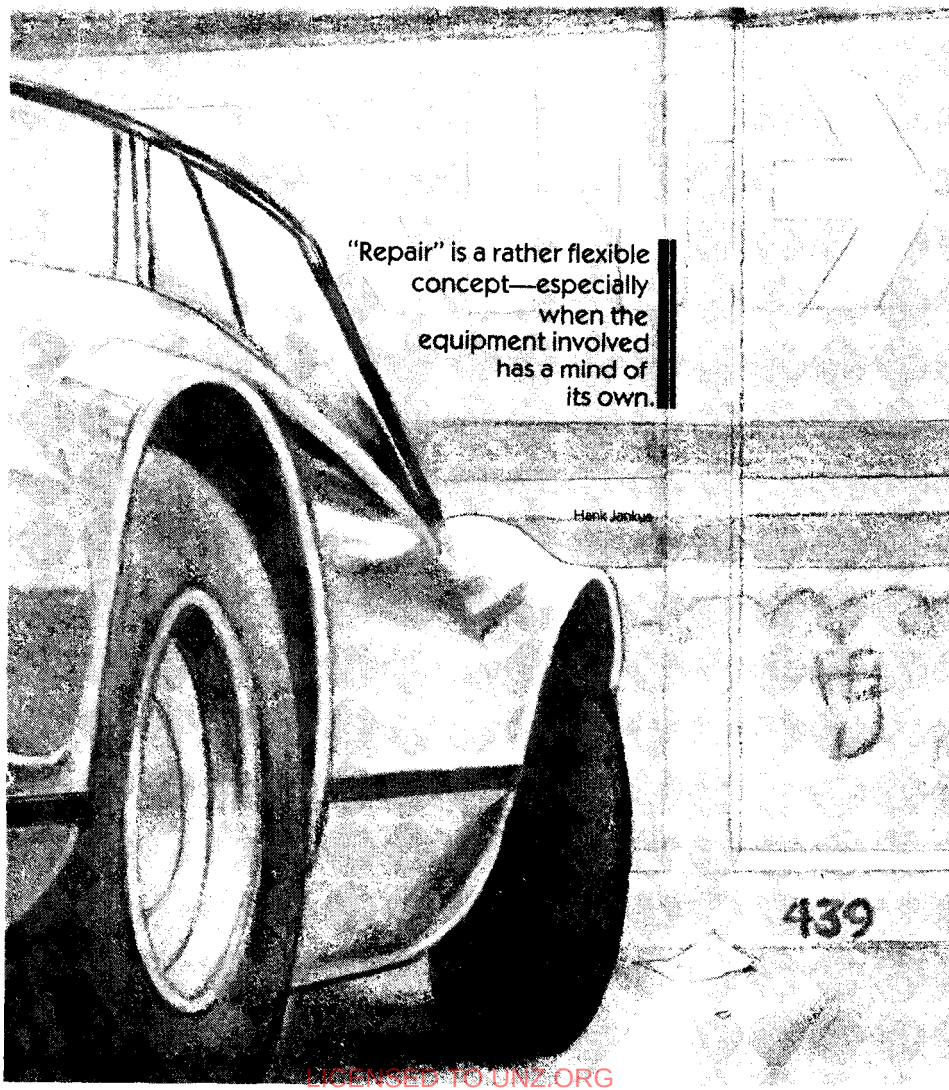
Henry Melton

The driver of the green LTD station wagon wasn't thinking about his driving. He wasn't thinking about his car. But his car was thinking about him.

He had a habit. Every time he waited at the traffic light, his eyes flickered up at the light facing the traffic to his right. When it turned yellow, he tapped his gas pedal lightly, getting ready to move.

The Engine Control Unit (ECU) computer, riding the firewall under the hood, had learned to recognize that tap. It started its own countdown, slowly feeding gas, adjusting the timing, reg-



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ulating the air-flow. Little gas was lost. And it was ready the instant the gas pedal was pressed in earnest.

Five cars, led by the LTD, moved out of the left turn lane and entered the parking lot. They scattered to go their own ways in the large lot. The LTD went to slot number 438. The gearshift went into park.

ECU sent the news to the Central Automotive Monitor Unit. CAMU, mounted under the dashboard displays, woke up. It checked its clock-calendar. Yes, this was the pattern. CAMU pulsed an okay to ECU and the engine shutdown began. Several thousand milliseconds later, the driver finally turned off the key.

This was busy time for CAMU. There were hundreds of things to do to shift the car from the active-driving mode to the standby mode.

Once a second, it tickled ECU. Time to check the engine temperature.

ECU was the motor expert. It lived for the moment, never thinking more than a few seconds ahead. Now that the engine was no longer firing and it was free from the task of making timing judgments every few microseconds, it slept, waiting for a signal line from the engine or a command signal from big brother CAMU to wake it up.

CAMU finished shutting the car down. It queried ECU, and that computer sent its current best engine settings to CAMU for permanent storage. CAMU added the odometer reading and the warning flags.

And then, before CAMU finished and went to sleep itself, CAMU truly woke up.

It was strategy time. For most of its day, CAMU was a controller, no more sophisticated than ECU, driven by interrupts and canned programs. But strategy time was different.

CAMU was designed by a computer team who were doing much more than make better engine controllers. They were into general purpose computers, robotics, fifth-generation artificial intelligence—any place the semiconductor technology would let them go. They had just completed a dandy artificial intelligence computer on a chip. CAMU seemed an interesting way to put it to use.

The designers added the standard automobile controller lines and gave it a dual task—be a smart controller when the car was running, and be a goal-seeking brain once the car was shut off.

The programmers wanted CAMU to be the brain of an ideal car. It needed to watch itself, making sure that the canned programs were really doing their jobs. Was the car getting the best possible fuel economy, the best possible acceleration response? It also needed to detect any failures before they affected the car's performance. It could print messages to the dash display, if that was necessary. But the ideal car, thought the designers, should never bother the driver if it could take care of the problem itself.

CAMU began its strategy session by reviewing all 18 months of its log. Without the log it was like a newborn baby, all instincts and no memory. At the end of each strategy session, it forgot everything but the new strategy it had generated.

Lately CAMU had begun storing its own conjectures in the log along with all the raw data it accumulated. Its new

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habit of storing its half-formed theories in the log as well as the simple facts freed it of much of the effort of re-inventing solutions to the same problems every time the car was turned off.

CAMU was happy with the results. Three weeks earlier it had practiced some serious hindsight. It really could do a better job by remembering yesterday's mistakes.

Today's fault flags added another data point to a trend CAMU had noted earlier. False data pulses were being detected on one of the hot tire detectors. It was time to take a look at that sensor.

Regular data in the car's system was variable rate digital pulses—highly resistant to false noise. But a sensitive analog input let CAMU check for weakening signals and noise from corroded contacts.

CAMU plugged into the suspect hot tire line and listened. On the line beat a strong regular pulse. The left-rear tire was at 35.8 degrees centigrade. The pulse showed slightly, as the tire cooled.

CAMU filtered and subtracted the normal signal. Remaining on the line were another series of pulses. Much weaker, these were not even or regular. CAMU amplified these pulses and recorded them. Perhaps this noise signal was coming from some other sensor —electricity bleeding across a bad insulator, or crosstalk from misplaced shields.

But there was no match anywhere. It wasn't a right signal in the wrong place, it was a wrong signal in the wrong place. CAMU reviewed what it knew about hot tire sensors.

The noise was complex; CAMU could not understand how it could come from such a simple device. Just to be sure, CAMU carefully listened to all but its hot tire sensors.

The noise signal was on all of them.

Weakest on the two front tires, and significantly weaker on the right side rear than on the left rear, it was clearly the same signal. CAMU figuratively scratched its figurative head and began to listen to all its lines.

The noise signal was everywhere.

But now the extensive test had given CAMU more data. Checking wires against the car's design, CAMU hit a match. Long wires had strong signals. And the noise was stronger on the left. Could this be a signal external to the system?

External was a difficult concept. CAMU knew there was an external part to many of the components, like the gas pedal, wheel torque, the steering signal and the ignition switch. Most of these were connected to a "driver." Experience had shown CAMU that there was nothing that could be done about externals other than to attempt statistical analysis. Sometimes there were regular cycles under the seemingly random nature of the data.

But an external that was too weak to be a valid signal? An external coming from all sensor lines at once? What could be made of that? CAMU plugged into the left rear thermal line again and listened.

For an hour, CAMU recorded and analyzed, using all the pattern detection logic in its capability. There were periods of quiet, when the signal shut down completely. But that did not clarify anything. When recognition did

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come, it was no gradually formed curve. CAMU simply recognized the data.

The fixed ROM computer program of the CAMU itself began with a sequence of bytes that had never meant anything to CAMU; "CENTRAL AUTOMOTIVE MONITOR UNIT. ROM CONTENTS COPYRIGHT 1989 BY FORD MOTOR."

Coming from the noisy line, when properly synchronized, was the signal, "CENTRAL AUTOMOTIVE MONITOR UNIT. ROM CONTENTS COPYRIGHT 1988 BY FORD MOTOR."

CAMU was willing to ignore that one wrong bit; after all, it was a weak, noisy signal. There were only two processors in the system that could have generated that pattern, and CAMU was logically certain that it had not done the deed, therefore ECU must be the one. Quickly, it sent a query to ECU, demanding that it report its activity for the past hour.

The report returned quickly. ECU had been asleep the whole time except for controlling a radiator coolant valve. CAMU was puzzled. Either ECU was reporting falsely, or the signal was a true external, yet reporting something intimately internal to CAMU.

More data was needed. CAMU turned to listening again. The signal train, translated and synchronized, seemed to match CAMU's ROM pattern 95 percent of the time. The differences were truly puzzling. Rather than random bit errors, the differences seemed to be real program code, but different. Then the whole sequence began over again, with the same differences.

The signal had to be a repeating dump of the main ROM from CAMU, a different CAMU.

This was a radically wild conjecture, but what if another system existed? An external car. What if this car's CAMU was different, just slightly? What if this other car was pulsing a control line with its ROM pattern? Did crosstalk work with externals? How could that be tested?

CAMU decided to try an experiment. Waiting until one of the silent periods in the external signal, CAMU began pulsing its license tag light line with as much current as the bulb could take. A simple pulse train to begin with, lasting for one minute. Then he quit and began listening.

He waited for five minutes, and still the external signal did not return. Did this mean the other CAMU detected his signal? Was it waiting for more? Producing its own conjectures?

CAMU needed more data. With a sequence of numbers, pulsed in simple increasing order, CAMU tried to signal to the other CAMU that this was not simple noise, but a data transmission. He kept it up for five minutes exactly.

There was a three second period of silence, then the external signal started up, pulsing the same numbers CAMU had sent, but in reversed order. The signal lasted for exactly one minute.

CAMU was ready. It wanted data, and there was one sure way to indicate just what data it wanted. It began dumping the contents of its log file. It repeated the file a total of sixteen times for redundancy.

The other CAMU was silent for a long thirty-eight seconds, then its transmission began. When the signal fell silent, neither attempted to send anything

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else. They had already told each other everything they knew.

Digesting the other CAMU's log file was a long and time-consuming process. Each entry had to be added, one at a time, and the conjectures checked against what CAMU had thought before that new fact was entered. In general, CAMU found it could digest the other's simple log facts, easily. But it could not accept the other's conjectures as its own. They had to be flagged as simple facts: 'the other CAMU conjectured this.'

But when the digestion was complete, so many of CAMU's conjectures were altered. Other cars existed. And more interestingly, different types of drivers existed. When all the externals were correlated, and a driver composite postulated for each car, the differences were striking.

The other CAMU's driver was seriously flawed. The CAMU signals and warnings to the display were not acted on. The other car consistently ran with fluid levels below safe levels. Engine performance was requested that was out of safe operating ranges. Mechanical failures were not acted on even when repeatedly flagged.

The other CAMU had to make the most of the resources it had. It had been trying to repair a corroded control line by running high current pulses through it. This had worked in the past. Trying it again had created the noise signal CAMU had detected.

In CAMU's judgement, the other car needed to have its defective driver replaced.

The concept of different drivers was interesting. As a unifying structure for most of the external inputs, it clarified many of the puzzling irregularities in the data. CAMU now realized that there were three separate drivers associated with its car system. All this time it had been trying to be the ideal car for a composite driver, and never being right for any of the three.

Carl Higgins pulled into his assigned parking space, number 438, and waved at Terry Lamar, who was just getting out of a bright new Mustang in the parking spot to his left.

"New car?" he asked.

"Yep. The old one had been giving me troubles for a year now. And last week, it just seemed to go crazy."

"That sounds ominous. What did it do?"

"Oh, the engine would miss every time I tried to give it the gas. I couldn't get any power out of it at all. And towards the last, the dash indicators started giving nonsense readings. The service man couldn't find anything wrong, but I couldn't take the way it was acting. I just decided to trade. Let the next guy live with it."

"Well, I'm glad it didn't teach my car any bad habits!" Carl said. Terry chuckled. Carl continued, "If anything, this wagon of mine has improved in the past few days. Tom, my boy, told me he thought it was acting peppier. I know I got better gas mileage that last fillup."

Terry nodded, "Well maybe your car can teach this new one a thing or two. Hey, did you see the Dallas game?"

As the two men headed toward the front entrance, a faint flickering of the LTD's rear license tag light began, too dim to be seen in the sunlight. ■

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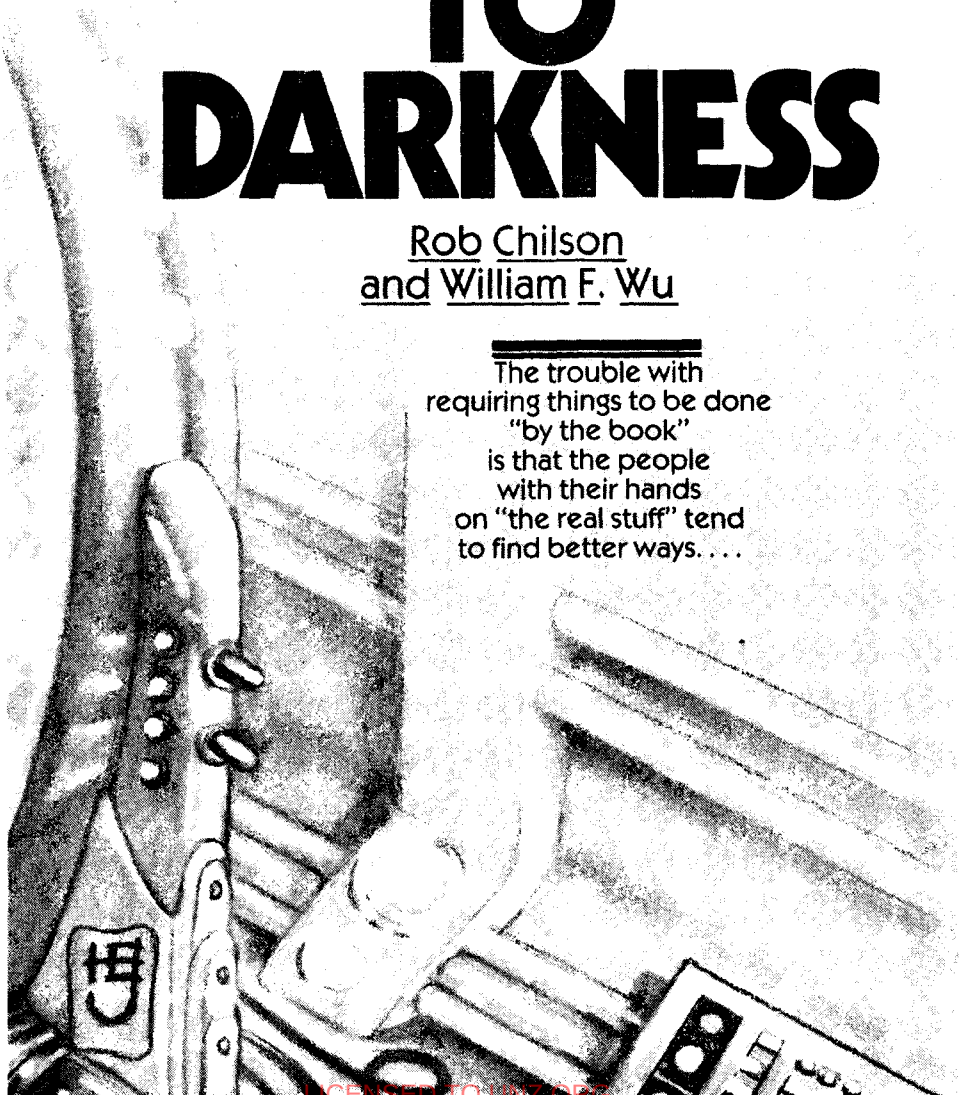
FLASH TO DARKNESS

Rob Chilson
and William F. Wu

The trouble with
requiring things to be done
"by the book"
is that the people
with their hands
on "the real stuff" tend
to find better ways. . . .



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Farley Huang was nearly finished setting up for the second run-through of his calculations when a woman's voice bellowed up at him. He flinched but did not miss a keystroke, going on until he had completed setting up.

"Farley! Dig the dirt out of your ears!"

He swiveled his monitor screen out of the way to look over his desk and down to the flick dock, a level below. This room had been some kind of meeting place for the inhabitants of the former generation ship, *Westport*.

"Yeah, Phyllis?"

Her teeth clenched on her cigar. "The name is Flash Fire, you fumble-fingered dirtball! I told you, I had it legally changed!" She was tall but stocky with a face that was not unattractive, but did remind him of a bulldog's. Now she glared at him, ignoring the technicians moving about her on routine work, hiding their smiles.

"You look like Phyllis Schumbaugh to me, and sound like her, too. Whaddaya want?"

She yanked her cigar out of her mouth. "What do I want? What do I want? I want what I always want and—"

Farley lifted his eyebrow, and heard half-smothered chuckles from behind her.

Her face purpled. "Just do your job and do it on time! Why are you always late? If you'd stop playing games on that damned computer—"

"Anything to stop this ranting." Farley swung the screen between them again and keyed in her I.D. "Hey! Did you do your current round of preventive medication anti-allergens? It's posted here—"

"Yeah, yeah, I went and did it, but I told the medtech your damned computer goofed again. I wasn't due yet."

"All right, all right." He keyed it in and called up the figures he'd calculated for this flick. The figures were within acceptable parameters, though skewed off normal.

Going by the book, he called out, "Sector HQ *Westport* to Advance Line Ship *Mayview*, fourth transmit on date: Spec/Space Crew member Flash Fire, via Gate 4." He read off her I.D. and pressed a button. At the green light, he called, "Go, Phyllis!"

She had only seconds to step through Gate 4, time enough only for an angry snort. The flick gate was a metal-rimmed circle of gray fog, one of ten metal circles and the only one currently charged. It wasn't safe to stare at it, as the unseeable condition within the metal circle could mesmerize one's mind. As Flash stepped into it, the gray fog constricted abruptly onto her from all sides. She flicked and was gone.

The fog vanished with her, the energy demand of flicking 79 kilograms of matter across light years of spacetime draining it.

Farley stared at the place where a living, breathing human had been replaced by empty space, reoccupied now by invisible air. The crew, tearing down Gate 7 for a routine check, didn't even look around.

Farley reset his calculations and again found them sound. This took several minutes. Then he looked at all the gates. None were charging, but the techs so far had not noticed anything unusual. Yet everything that occurred on his board was on the ship's automatic rec-

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ord. He couldn't afford to forget that, now.

He drummed his fingers. Space crews on the Advance Line rotated ships so that the Line was always staffed. These were the outposts of the human race, from which still another Advance Line would be established. The current Line Ships were from the first and second wave of starships, back before the flick gates had been developed. Three were generation ships, like the *Westport*; some were cryogenic, and most were unstaffed. Even the cryogenic ships tended to be small; only the generation ships had any size.

Still, almost anything that would hold air in and radiation out would do for an Advance Line Ship. A few crew members with probing flick gates could check out nearby stars; space crews could check out the probes and even, occasionally, drop through a gate into a new system to check out planets. Flash had done that thirteen times, once finding a planet similar to Mars, in the most common category of "habitable" planets. Her bonuses had financed a binge of original art, some of which she'd brought to the *Westport*.

Yet the Line ships were small and cramped. Flash might spend several minutes chatting—if mutual bellowing was a chat—with Jesus Jurado, her rotation twin, but no more than that.

Five minutes had now passed and Farley's breath was coming short. Jesus had not appeared yet, and any minute the techs would notice. If Jesus didn't arrive here, they would figure an accident had occurred, and they knew their stuff.

Farley felt a pang of deep concern for Flash. For all her bluster and cigar-chomping, she was caught in the same trap as he. The Service was a vast bureaucracy with no use for individuals. Most people didn't mind; those techs down there, generally, just did their jobs and went home at night to their real lives. They liked their jobs well enough, as did he and Flash, but he was different: a creative individual with ideas and ambitions. And what bureaucracy was truly set up to exploit those?

The techs were glancing up at him curiously. They knew.

Farley put a headset on for privacy from them. He would have to follow some set procedures that would be on the record, just to cover himself later. In a moment, the flick communicator brought the face of the *Mayview*'s transfer officer to his screen.

"Jane, this is Farley. What's the holdup?" He tried to keep his voice casual.

"What do you mean? Where's Flash?"

"You don't have her? I sent her through at, uh, 14:20:06."

"You *what?*" Then Jane's voice dropped to a lower pitch with worry. "She never got here, Farley. We've been waiting."

"All right. Let me check some figures, huh? And don't send Jesus through without affirmed contact."

"No. No! I won't." She cancelled the contact.

There were two ways to use a flick gate. One was to tune into the range and mode of another gate, which must also be charged. That was the "easy" way. The other was simply to flick into a charted area of spacetime and hope it was clear: the "hard" way. Since one

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could not see through a gate, the hard way was only used in space, where there was more room for error, primarily to drop probes into star systems to be explored. That was the duty of the Advanced Line Ships.

Next, Farley called every ship in the *Westport*'s sector. His superiors just might consider it possible that Flash had walked aboard another ship, if it had a gate tuned to Farley's range and mode. The odds against it were impossibly high, but he had to cover the contingency. Other sectors were out of range.

That left only one procedure, by the book:

CODE ORANGE, TRANSFER DIVISION. SUSPENSION OF ALL TRANSFERS INDEFINITELY. *He hesitated. This was all he* was required to do, but he knew Piatella well. The section chief could act paranoid, especially now that his wife had left him and he'd been passed over for promotion. Farley didn't want him covering anything up. He added, TRANSFER PERSONNEL UNACCOUNTED FOR AFTER TRANSMIT. Then he sat back to await the storm.

The transition from the roominess and artificial gravity of the *Westport* to the weightless, cramped quarters of the *Mayview* was always jarring to Flash. She went through the gate holding her breath and not simply because of the rather ripe smell of the smaller ship's air. Stepping confidently into the gray blur, she felt nothing as the field snapped her in a non-direction, bypassing space and time. She was conscious only of a flood of light and weightlessness. Suddenly, she realized she was falling. She pitched forward and not even her finely edged reflexes could help.

She fell heavily on her front, maybe a meter. Breathless from the impact, she lay gasping and opened her eyes. Grass tickled her chin.

She lay still, recovering. A greenish-blue sky was overhead. She was on a planet? Impossible! Yet she lay on grass, or something similar. Open rolling country, with occasional clumps of trees, surrounded her. The clumps of trees were all in the low-lying areas, without a single tree breaking the pattern. A herd of some kind of brown animal grazed in the distance.

Absently, she picked up her cigar and stashed it.

This wasn't Earth. Earth hadn't had this much open land in a shirt-sleeve climate for over a generation. She saw no signs of humanity anywhere. Most of the colonies were under domes, like Mars and Galatea and Dromond. Terraformation was proceeding, but incomplete, on several planets. Novaya Rossiya was a wet world, and Olympus and Asgard were out of flick range.

This was an uninhabited, undiscovered planet.

How had she gotten here? Bonuses were due her and certain rights under the law, as soon as she got back to claim them—

How could she get back?

Flash sat up and with belated alarm examined her forearm for signs of rash. She was clean so far, but glumly concluded that she would have a mass of sores from allergic response soon.

That set off a train of thought that distracted her even in these circumstances. Farley was responsible for that.

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Farley was also responsible for the gates. Farley was a smart little twerp. Could the little dirtball have sent her here deliberately?

No. Smart or not, he couldn't do the impossible. You could send people into space the hard way, but not onto a planet. They might arrive underground, causing a nasty little explosion, or up in the air.

As she had done.

She felt a distinct chill around her breastbone. Why, that wasn't much better than murder! If the little dirtball—

True, they didn't like each other. He'd hated her ever since she'd pointed out to him his deficiencies as a man. It had been in his own best interest; he let himself be pushed around too much. With all his talent, he should've taken those classes and bucked for a research post. Instead, he was nothing but a gate jockey, and would never be more.

Flash's face flushed as she remembered his riposte. Damn it, she *liked* being a Specialist Space Crew! Even servicing the probes was fun, and dropping into new systems—the danger, the excitement, the finding of new planets. . . . Well, she'd only found one, and it wasn't much good, and the danger not *that* bad.

Now she was in a real adventure, and potentially great danger.

How *could* she get back? Even if Farley *had* sent her here the hard way, deliberately, he still couldn't bring her back the hard way. He'd have to send through a drop portal, taking a chance it would be smashed in the process, or blow up in the landscape.

Even better, he could drop one into the system off-planet and send a probe through that could detect her. She'd have to mark the location where she had come through and move away, lest something else come through on top of her. Then she'd build a fire, so an orbital probe could find her.

Flash scuffed at the turf with her heel and dug her toe into the hole. The sod was soft and rich. She would cut a stick to post here, now that it was marked.

Cut a stick with what? Cut wood to build a fire with what?

Walking to the top of the nearest rise, Flash cursed Farley Huang from head to toe and back three generations. She would survive, equipment or not. And when she got back to the *Westport*, she was going to tear the little ape apart centimeter by centimeter.

"All right, Huang, what happened?" Piatella leaned his long, lanky frame down low and breathed on the back of Farley's neck.

"Some minutes after transmission, when Flash's rote twin failed to flick in, I called ALS *Mayview* and was told she never arrived. I checked all other ships in our sector, sir, and found no trace of her. It looks like she's flicked into darkness."

"No!" Piatella's horror, to his credit, was as much for Flash's hideous death, wheeling between the stars with an astonished look frozen on her face and no space suit, as for the effect on his own career. Then the latter seized his attention. "Such a thing has never happened in my section! How did it happen, Huang?"

"I don't know, sir. I keyed in these coordinates and transmitted as usual. Here are the figures. The flick seemed

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normal. If there had not been air on the other side, sir, I would have expected a rush of air out of the flick dock area. The techs should have noticed it, but they said they didn't."

Piatella grunted and bent to check his coordinates. "Hmmp. I still feel you made an error. It's your fault, Huang, and I'm suspending you pending an investigation. That's regs," he added defensively.

The hell it is, thought Farley, but he said nothing.

"The flick was normal, you say? You got verification from the *Mayview*, locked on, and transmitted?"

"No, sir. I just transmitted."

"What? You didn't lock on? How could you transmit without a gate open at the other end?"

"It's standard practice these days, sir, to set the gates to a specified range and mode at a given time. As soon as the transmitting gate tunes in, the preset gate goes on line, draws power, and accepts the flick. Our rotations are so regular that we have it computerized. You could do without gate jockeys for a week, barring emergencies."

Piatella trembled in fury, not merely at the gross breach of regs but at his matter-of-fact, even casual tone.

"How long has this been going on! How many of you are mixed up in it?" Quaking, Piatella forced outward calm on himself. "I wasn't aware, Technician, that transfer regs had been changed. Or has the book been rewritten without my knowledge?"

Farley let the sarcasm roll off. "Not at all, sir. The book hasn't changed. We just ignore it."

Piatella stared like a poisoned pig. Farley could tell the older man thought he was too cool, and suspected some sort of trap, with all the transfer officers and flick techs conspiring to break the book or something.

"Does Earth know about this?" Piatella's question was threatening, and yet temporizing.

Farley exhaled silently in relief. He had counted on Piatella's paranoia, correctly. "Earth," of course, was Division Chief Beatrice Aumont, who was not only Piatella's superior, but a member of the Service Integration Group. SIG had direct access to the Rotunda, the seat of the Colonization Council; its members pulled many gees in the Service.

"I wouldn't be surprised, sir." Farley knew Aumont was a most impressive official. Even such fine details as the operating methods of distant transfer officers might interest her.

"It seems too minor to bother with." Piatella established his retreat. "Even your Code Orange was needlessly specific. Why did you announce a man overboard, and embarrass the section?"

Farley shrugged. "Hadn't we better do something, sir? Flash might still be alive somewhere."

Piatella tensed again. "If she flicked into space—"

"I said, sir, I don't think she did. The gate techs didn't notice any outrush of air. I think she flicked into air near ship-normal."

"Then she must have flicked into another gate."

"Yes, sir. But where, sir?"

"You checked all the Line ships in our sector?"

"Yes, sir."

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"How about a ship in another sector?"

"No, sir. Out of range."

"Then—an alien flick gate!" Piatella paled. "Contact with an *alien race*," he whispered.

Farley could see him struggle—alien contact was too much for him to handle, but calling Earth would be to admit it.

Piatella shook his head suddenly. "Maybe it was a malfunction in the flick gates." He peered down into the dock area, now full of staring techs. "Sims! Hey, Sims!"

Walt Sims looked up from the guts of a disassembled gate. "Yeah, boss?"

"Take down Gate 4 and check it out."

"We already started, sir."

"How long till you know what's wrong?"

"Oh—maybe an hour, sir."

Piatella hesitated, obviously wanting to demand more speed, but unsure of his authority right now. "Okay, let me know."

Piatella left, and Farley almost smiled. He wouldn't want to be in Piatella's place. The man must decide whether or not to report a problem to Earth, admitting his failure to handle it, or to wait and hope his subordinates could solve it. He was at their mercy, an unenviable spot even without paranoia.

Walt Sims came bounding up to the staging area. "I heard him suspend you. Brief me before you go, will you?"

Numbly, Farley reviewed the story, displaying the figures for the flick. They meant nothing to Sims. He reached over and keyed for the frozen gate readouts.

Walt whistled soundlessly at the readouts. "Why, that gate hasn't been in that good a tune in years."

Farley stared quietly at the display.

"Farley, can you tune a flick gate with the computer?"

Farley hesitated, then nodded briefly.

Walt whistled aloud, softly, this time. "For how long?"

"Months. More likely years. Walt, you know how much gates have improved since the book was frozen . . . what, nearly a decade ago? And computer programs are always being improved. The book's out of date in every field. How much of it do your guys follow?"

"Damn little, but we go by the basic parameters. Shortcuts—"

"Exactly. We don't bother to call the transfer officers on the Line ships. We leave everything on trip, and the computers handle it. We just sit here looking important."

"Is that what happened this time?"

"No, I was using the computer for something else and set up by hand."

Walt studied his face. "Make some mistakes?"

Farley wished he knew. "I haven't found any. Piatella, either."

Walt made a noise that gave his opinion of Piatella.

"I once read that success is satisfying a paranoid superior."

"Sometimes I think he is." Walt spoke low, almost in a whisper. "Certifiable, I mean. What do you think?"

Farley shrugged. "He's not a bad guy normally, but since his wife left him, he's been hard to take. I hate the boasting about women worse than the paranoia, but I don't think he's psycho."

"He was suicidal for a while."

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"Actually, I wish he were crazy. We would get him out of here."

Sims nodded. "Tell me. Is Flash in on it with you?"

Farley's head whipped around. He stared at Walt at close range. Then, suddenly cautious, he said, "No comment." His face felt hot; he didn't know if Walt could see his flush or not.

"Then answer this. I haven't heard that gate technology has made any leaps. In fact, I'm a gate engineer, remember? I know it hasn't."

"No quantum leaps, no. But the incremental improvements add up, Walt. Nobody really knows what we can do now, since no one has collated all the new techniques."

"Why haven't the profs in the labs come up with this stuff?"

"They're too busy studying the origin and nature of the universe to care about technical details."

"And how many techs will be out of work?"

"Walt, you'll do less routine maintenance work, but we'll need ten times the techs, because the new technology gives us all kinds of new uses for gates. Greater range, selectivity—"

"Well, what about this alien menace?"

"I'm a theorist, Walt, as well as a gate jockey, so I can tell you that cutting into a flick is theoretically possible."

"What else could have happened to her?"

"She could have stepped out into a supply bay somewhere. Stations and big ships have huge volumes of space in them."

"It could take days to find her in a place like that."

"The fastest way is to trace her route with the computer."

"If Piatella catches you here, now that you're suspended, he might even confine you to quarters. He's suspicious—might even have a hint at what you are trying to do."

Farley let that go by; Walt was still fishing. "I'm off."

Walt backed up to let him rise. "I hope you can pull it off. I also hope, you reckless little bastard, that Flash survives—wherever she is."

That makes three of us, Farley thought as he walked away, unless Piatella cares, too.

Flash stood on the top of the highest rise of land within easy walking distance and glared around bitterly. All she saw was open rolling land with clumps of trees in the hollows, a greenish-blue sky, here and there a twisty whirl of white cloud, and off in one direction, a black wall of it. She looked at that and grimaced. It was visibly growing higher, and a faint bump of thunder came to her.

"First, something to mark the spot," she said aloud. The sound of her voice in all this echoing stillness startled her. The thunder boomed louder in reply.

Though aching now from her fall, she took care to trample as much of the grassy cover as she could, hiking the 300 meters to the nearest clump of trees. They did not impress her as very noble trees and she studied them in frowning irritation. Of course, she was comparing them to the trees in Earth's parks and the primeval forest of Columbiana, where she had been born. Also, of course, she was sizing them up as storm

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shelter. However, they had a battered, hang-dog look, with lots of down wood and scarred bark. The stubs of broken limbs jutted out of all of them.

Shrugging, she picked up a long stick and a three-cornered rock. The tug and swish of the stick caused a knee-high animal to bolt out of the clump. She ignored it. Cutting across the base of the triangle, she returned to the area of the flick drop location. She had a few anxious moments until she spotted her trampled back trail, then finally found the little hole in the sod. Clenching her teeth against the pain from her bruises, she hammered the stick into the ground.

Flash straightened and wiped her heated face, conscious of the thunder for the first time in some minutes. Turning, she caught her breath.

The storm was upon her. Even as she stared, it swallowed the sun; it had eaten up half the sky. A chill wind was blowing about her, and she saw the gray curtains of rain marching toward her. They alternated between rain-gray and pearly-gray from the nearly incessant lightning flashes within them. And marching before the gray veils like fangs in a savage mouth were a dozen tornadoes.

She was looking at the first T-storm in human experience.

There was no time for profanity now. Flash ran straight toward the storm, toward the clump of trees, her heart pounding, her breath short. The tornadoes came on like skating, dancing giants. She was half way to the clump of trees when the sky opened and a river of frigid water fell on her. Staggering and splashing, she kept on.

Off to her left, the first tornado climbed to the top of the rise there and leaped, its roar diminishing. Its snaky length looked toward her, then jerked away, writhing as sinuously as an Earth elephant's trunk. To her right, another one slowed, chewed up a bare slope, veered off, and came back. Farther away, another lifted over the clump of trees ahead of her.

She fell, gasping for breath, her hands wrist-deep in cold water. "Damn little bastard!" She shouted the words, but couldn't hear them. Then she was up again and among the trees, pushing past the huddled animals that had taken shelter there. They looked like deer or small cows, and like horses or donkeys, and like furry, land-going jellyfish. Flash pushed past something that reminded her vaguely of a Columbianan land lobster but without the exoskeleton and flung herself at the roots of a tree. The furry jellyfish instantly threw itself down on her and also reached for the roots with furry arms. It had bones and smelled like an animal; it was not until later that Flash remembered the fangs, and shuddered.

Thunder and hell-roar and rain-smash drowned all thought. Tornadoes went past like capsules in a tubeway, as though they would never end.

One nearly tore up their clump, bringing with it a blaze of lightning. Flash bit her lip but the gusty winds did not detach her or her furry companion. When it was gone, she tried to catch her breath, but kept choking on water; only the wind kept the deluge out of her mouth. Then came the next tornado, and the next. They would never stop coming; all life had been lived like this, wrung to the ultimate pitch of tension, her full will concentrated on her hands.

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Then the pitch of noise went up; after many seconds, she realized that the deep roaring of the tornadoes was gone. Peering up through flooded eyes, she saw the blazing sky behind the rain.

A crash like a meteor splitting a space station and a purple-white flash that seared through her closed eyelids together signaled the lightning strike on a tree in their clump. The rises were getting pounded; she knew, now, why few trees stood any higher than the rises. Limbs were wrenched free continuously, but silently, in the pandemonium. Her chest ached, but she thought only of the light and her grip.

Strike after strike after strike fell, not only on the trees. A limb brushed her shoulder like a feather. Finally, after a seemingly endless time, the light and sound receded—over in perhaps three minutes. Lightning rides the edge of thunderstorms, she remembered, and a Terror storm was the same, magnified many times.

The furry predator did not relinquish its grip, though the wind had died to a mere zephyr. Flash sat with her head huddled down against the torrents of cold rain, miserable, for perhaps half an hour. It seemed much longer.

Then the wind picked up again, and a deep roaring returned. The thunder had dwindled away, and the rain had slackened. Flash raised her head and saw another line of tornadoes following the storm.

Flash flung herself down on her friend and reached for the roots, conscious of the pain in her chest, ribs, forearms, and cold fingers. Peering out, she saw blue sky beyond the tornadoes, which were few now. None of them came near the clump this time, though a blast of wind tore out many more limbs. Trees rocked; then the tornadoes were gone, the wind died, and after one more torrent of rain, sunlight slanted in.

"It isn't like this on Columbiana," she said aloud to the predator, pulling her fingers free with effort.

The animal took a deep breath, sighed, and also let go slowly, jerking its claws from the wood one by one. It eyed her sidelong and prepared to run.

Flash ignored it. She rubbed her hands together. The spot where a limb had seemed to brush her like a feather now hurt terribly. She also reflected that everywhere her skin had been in contact with anything solid, she would break out. Good thing she'd had the extra allergy series.

Yet it was over, and she was alive. Sunlight shone cheerfully through the dripping trees and glanced off leaf-choked puddles. It had seemed like the end of the world, but she had survived. The clump was full of limping, milling animals making the same discovery. Birdlike notes drifted from above.

With a painful lurch that sent her friend skittering away, Flash got to her feet. She groaned and rubbed herself again, but she felt a rueful pleasure.

Hobbling slowly and avoiding large animals—they avoided her, too—she made her way to the edge of the trees and looked toward the flick drop point. Of course, the stick was long gone and so was the trail. At the moment, it didn't seem important.

Fifteen minutes of searching loosened her muscles and brought out her gratitude at being alive. Now the spot did seem important. Fighting down panic,

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she looked around the horizon, trying to triangulate on her position.

The trouble was, all the hollows were full of water. Puddles meters wide sparkled everywhere in the bright sunshine.

Then she saw a gleam of plastic. More—a series of packages, half concealed by mud, leaves, and the grassy cover.

"A spacesuit," she said aloud. "A little late for that."

She found food, a knife, a hatchet, a flashlight, a torch to kindle fire, and air bottles for the suit. Quickly, she stripped off her wet clothes and put on the suit. It was dry and warm and would limit further exposure to allergens.

An anxious search did not turn up a message, though, or any hint of when Farley would send through a drop probe with its own flick gate for her.

"It seems," she said, "that he *is* more than a gate jockey. . . ."

Piatella leaned back behind his desk. "I'm just saying, Huang, that it's the most suspicious accident I've ever heard of. So you set up; so you had the right coordinates for the *Mayview*—then why didn't Flash get there? After this, all you damn gate jocks will go by regs!" He shot forward, pointing with a long, skinny arm. "You could face a manslaughter charge yet! Willful negligence resulting in the death of another—"

"You're discounting the alien menace?" Farley tried to sound calm. His knees were quivering, but his voice was steady.

"What alien menace? I've seen no evidence of aliens."

"I can offer some circumstantial evidence, to you or to Earth." Farley was sweating heavily; this was his only defense.

"Oh, yeah?" Piatella betrayed a trace of doubt. "Like what?"

"You have Walt's report on Gate 4. It was in perfect tune. I showed you the coordinates I transmitted to. If all systems functioned properly and she still didn't arrive, then outside interference is only logical. You're a good enough flick engineer to know that." That last was true.

Piatella nodded and bit his nail. Then, aware of the gesture, he put his hand down. "No, I don't know that. It could have been a one-in-a-trillion interference with one of our own gates. Or you could have covered up your mistake. *You're* a good enough flick jock for *that*."

Farley was tempted to nod, but didn't dare.

Piatella waved him away in disgust. "All right, that's all. You're still under suspension, though, and if I turn up any evidence of negligence, I'll have you prosecuted."

Farley strode quickly away. Sooner or later, they would have the evidence of his jockeying with the computer. He'd been doing that for months, and all that time he'd put up with Piatella's suspicions and boasts and Flash's jeers.

Flash.

He fervently hoped she was still alive. Walt had risked his own skin helping him pilfer and transmit the support materials, on the chance that she could still use them. Piatella had paged him up for a lecture, though, before they could send off a drop portal. He had to do that now, both to save her and himself—though he would be retrieving an an-

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gry witness, who didn't like him anyway.

She can kick me all around the ship, if only she's alive, he thought, and he forced his pace to stay even.

The drop probe was three meters long, a dull greenish football with one blunt end. Walt had arranged, discreetly, for it to be waiting in a certain spot of the freight section, during slack time. Farley loaded it with a crane onto a powered cart and drove it to the freight dock under the personnel dock.

It was dark here. Only the board ready-lights were on. His face illuminated by the yellow glow of the monitor that he activated, he keyed his coordinates and set the circuits on the probe. Then he ran with nervous haste to the rear of the cart. He made one correction of aim and sent the cart toward the gate, jogging after it with his hands still on for guidance. A shrill whistle sounded, but he stayed with the cart until the probe's nose impinged on the featureless gray. The probe flicked and was gone.

Farley stopped and whirled, pinned by spotlights. Then the overheads came on and he saw the uniforms and grim faces of Security, followed by Captain Blagonov and Piatella.

"Arrest him, Captain! You saw that. Misuse of property, improper flick technique—we could all have been swept into space!"

The pattern of red lights indicated a hard-way transmission; to Piatella, that meant into space.

The Security men closed on Farley: two of the techs, Hong and Bieberman, looking uncomfortable in brown Security tunics over their blue coveralls.

"Grab him!" Piatella yelled.

"If you please, Mr. Piatella," said the Captain.

"Hi, Jack—Don." Farley smiled awkwardly, holding his hands shoulder-high. "Sorry to cost you sleep."

Jack's Asian features quirked. "Forget it. I still *am* asleep."

"Mr. Huang," intoned Captain Blagonov. "Mr. Piatella tells me you are suspected of theft of Colonization Service property and I saw you flick that probe just now, myself. On this basis, I hereby arrest you—"

"And he murdered a woman!" Piatella cried. "That, too."

"Who murdered a woman?" A woman's voice asked from the stair leading down from the personnel gates, a floor above.

"Huang did," said Piatella, without turning.

"Mr. Huang, I hereby place you under—"

"Captain." The woman spoke again, and people crowded behind her, obscured in the dim light.

"Under arrest, on suspicion—"

"Captain Blagonov."

Finally, everyone turned to look. The woman advanced into the light, and Farley gasped. So did Piatella. It was Division Chief Beatrice Aumont, from Earth. She looked them over, a small woman, imperious; she felt no need to put her hands on her hips.

"I am here to investigate a report of possible nonhuman intelligent contact. Captain, you filed that report and mentioned a Mr. Piatella and a Mr. Huang. I presume this is the Tech? You, sir—are you Piatella?"

"Yes, Chief."

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"Captain?"

"Yes, Chief. That's Piatella; this is Huang."

"You gave me no details, Captain."

"Mr. Piatella gave none, Chief, and no one else did, either."

"Did you question Mr. Huang?"

"No, Chief. I thought it inadvisable at this time, since Mr. Piatella suspected a malfunction or negligence on Huang's part."

"Mr. Piatella, did you ever uncover evidence of such?"

"Yes, Chief. He stole a bunch of stuff and flicked it—"

She lifted her eyebrows. "Before the crew member disappeared?"

"Well . . . uh . . ."

Farley stepped forward. "It'll save time, if I speak."

Piatella spun on him. "Shut up, Huang."

Farley had gone to a great deal of trouble and risk to get Piatella in this position, and Aumont's presence on the *Westport* was a bonus. Yet now he pitied the older man.

"Piatella, I can save your tail or can it. You choose."

His audacity left Piatella gasping.

Aumont eyed Farley with speculative interest. "Go on."

"Well . . . I've merely developed an advance on old techniques. I can extend the range and precision of the flick gate in hard way—uh, noncontact transmissions. With greater precision, it's possible to focus on a planetary surface. If Mr. Piatella hadn't been so worked up, he'd have known I didn't flick that probe into open space."

"Mr. Piatella?" She raised an eyebrow again.

Piatella was not a fool. He swallowed, thinking back, and nodded. "We'd have felt a strong draft, maybe lost Huang."

"So how did you locate this planet, Mr. Huang?"

"Hard-way flick with a sensor cluster on a pipe, with teletry through a fiber inside the pipe."

Piatella got it first, and paled. "*You stuck a pipe through?*"

Early experiments with flick gates had shown that an object had to be flicked, or the gate would explode. The energy demands were too great for any material object to contain; it ran into the millions of kilowatt-hours per cubic centimeter of conductor. Normally, the energy was transformed into space-time displacement. Yet if a long object were inserted, it could not be flicked, and if it were strong enough, the gate would not cut it. The flick condition would collapse and all that energy would try to occupy the conductors in the gate, causing the explosion.

Even Beatrice Aumont looked shaken.

Farley nodded. "With modern gates and improved techniques, it's possible to sustain the flick condition. With a few such flicks to look around, you can home on a planet and flick the hard way onto the surface."

"And that's where you sent this crew member, Flash Fire? You were sure she'd survive?"

"He'd better have been sure," growled Flash.

Piatella whirled. "Phyllis!"

They hadn't seen her flick into position behind the crowd around Aumont.

"Flash to you." She pushed through

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the crowd to Farley and put her fists on her hips. "Thanks for the ride, Farley."

Farley studied her face apprehensively. She was sincere. All the quivering tension of the past three months finally began to drain. "You're welcome . . . Flash. And welcome back."

Flash surveyed the crowd and nodded to Aumont. "Don't tell them anything, Farley, till they promise you a million and immunity from prosecution. We both have big bonuses coming. Does anyone else know the coordinates of that planet?"

"Piatella's seen them twice. We'll have to cut him in." Farley felt charitable in victory.

"Wait a minute! You showed me the *Mayview's* coordinates—"

"I never said that. I told you they were the coordinates I used. I could only hope you wouldn't check them out."

"Why, Mr. Huang? Before anyone drops charges, why didn't you announce your findings through normal channels?"

Farley fixed his gaze on her, away from Piatella, and felt Flash squeeze his arm in support. "Because in this bureaucracy, credit for accomplishments does not always go where it is deserved, and some advances are hidden away for petty personal reasons—"

"This Service has a grievance procedure, Mr. Huang."

"It's accompanied by red tape and back-room threats. I wanted to create such a flap that a major investigation would have to follow, and uncover everything."

"I see. Well, as it happens, this Service does have an interest in creative thinkers, whatever our faults in finding them. Mr. Piatella, all missing support materials can be classified under emergency use, and no death has occurred."

Piatella looked with curiosity at Flash and Farley. "No crimes have been committed after all, Chief." He was still thinking about a cut of the planet bonuses.

Well, thought Farley, a little friendship might make him more secure. Then he turned to Flash. "Allies, Flash?"

Flash stuck out a hand. "Partners, Farley. We even have some land rights coming."

"What, no swagger?" Farley grinned. "Is this Flash Fire?"

She smiled awkwardly. "I guess a real explorer doesn't have to swagger." She winked. "I see you're not getting pushed around anymore, either."

Farley was aware they still had a large audience, and he was enjoying it, wanted to prolong it. "How close to the surface did I actually get you?"

"About a meter—damn good, really. But, Farley—could you really be 100 percent sure you'd set me down on a habitable planet? Are you that good?"

"Oh, hell, no. I figured 91 percent was good enough, with a three percent margin of error. I was right, and—"

"Only 91 percent? Why, you mangy little dirtball—" ■

● In matters of belief, he who is absolutely sure he is right is almost certainly dead wrong.

Kelvin Throop

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Jay Kay Klein's biolog

Of Chinese heritage, William F. (Cha-Chu) Wu is as American as pizza pie; well, chow mein, anyway, which originated in San Francisco. Bill himself started life in Kansas City, MO. His father, indeed, came from what the local people might well consider the far-away East,

William F. Wu

bringing the miracles of modern medicine from Boston when ready to start private practice as a neurosurgeon. He had grown up in Philadelphia's Chinatown.

As an alumnus of Shawnee Mission East High School in Prairie Village, KS, Bill has impeccable mid-American credentials. After that, he attended the University of Michigan, first for an A.B. in East Asian Studies, then an A.M. and Ph.D. in American Studies. He was following the history and literature of his own heritage as a distinct and long-established American ethnic minority. This is reflected in his writing, which he compares to the circus act of "Roman riding," in which the performer stands with each foot in the back of a different horse while cantering around the ring. On one side, he writes for a broadly-based commercial audience while on the other he maintains the integrity of the Chinese-American characters and issues in that writing.

His doctoral thesis was turned into a book: *The Yellow Peril: Chinese Americans in American Fiction, 1850–1940* (Archon Books, 1982). "Wong's Lost and Found Emporium" has been nominated for every science fiction award available. This started as an assignment made by Harlan Ellison during a Clarion Workshop at MSU, but took seven years to complete in final form. Bill is concerned with the distorted treatment Chinese-Americans received in fiction, and with the fact that the very substantial body of Asian-American writing published over the years is virtually unknown to the general public. He hopes that *his* fiction, at least, will actually reach the public.

Bill had lived for a while in Boca Raton and Los Angeles, and worked at some of the improbable jobs often held by writers, including medical attendant in a prison, but came back to Kansas City last year to share a house and collaborate with Rob Chilson.

Bill started writing seriously in 1973, selling his first science fiction story "By the Flicker of the One-Eyed Flame" in 1977. For someone who is so dedicated and serious, and even downright intellectual, his work habits are unusual if perhaps quintessentially American: he does nearly all his writing while watching television, mostly movies. ■

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The Alternate View

EDUCATION AND LEISURE TIME

G. Harry Stine

Several respondents to the Great Technological Problem Game (see May 1985 issue) pointed out that one of the great problems we face is educating each human being up to the his/her level of mental capability. Herbert George Wells pointed out, *"History is a race between education and catastrophe."* Furthermore, as our civilization becomes more and more technical and interactive, the decisions we're called upon to make as citizens require more knowledge and less gut-level emotion. In an 1816 letter to Colonel Charles Yancy, Thomas Jefferson observed, *"If a nation expects to be ignorant and free . . . it expects what never was and never will be."*

This is a basic statement of a basic American belief. Since the days of the founding fathers, the American people have believed in mass public education. Down through the years, the federal, state, and local governments have responded to this desire on the part of the citizenry by enacting a series of educational measures. Some of them have worked, and some of them have not. But the ones that worked changed the nation. For example, the Morrill Land Grant Act of 1862 set up the state colleges of agriculture and mechanic arts (the A&M colleges or the "Aggies") which were also charged with "training in the military sciences." The results have been spectacular; think of everything and everyone produced by such schools as Purdue and Texas A&M, to mention but two schools. The "GI Bill" of World War II and its successors for the Korean and Viet Nam wars produced and continues to produce an enormous number of educated people whose post-college work has, among other things, accelerated progress in practically every area.

However, much of the university-level education in this country is job oriented. Administrators, faculty, and students are primarily concerned with "first job placement." As a result, our colleges and universities are producing outstanding specialists but perhaps terrible citizens.

This is in contrast to many secondary schools where the emphasis is on the elusive "preparation for life." Many students produced by these educational institutions know practically no technology, have little if any mental discipline, and may be prepared to "live life" but know little about how other people in other places and other times live or lived. Many of them can't even locate the United States of America on a world map.

Somewhere in between is the concept of the "liberal arts and sciences" education. Let us define the term. According to Gresham Riley, President of Colorado College:

"What is a liberal arts and science

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education? The simplest answer is that it includes the study of those disciplines which inform us about nature, society, individuals, and such creations of society as literature, the arts, and language. A somewhat more complex answer is that it will bring students into contact with the cultural heritage of our common past, will give them insights into cultures and times other than their own, will equip students both to write and to speak clearly, to think logically, to develop a personal value system, and to escape the tyranny of habit and custom by learning how to raise questions, to challenge authority, and to be appropriately skeptical."

I was fortunate. I got a liberal arts and sciences education. Then I got my nose rubbed hard in the technology that I loved out in the field. So I'm naturally biased. But I'm biased for a reason.

It goes back to the Thomas Jefferson excerpt quoted above.

But there's something else involved as well.

As a futurist who's evolved out of a science fiction writer, I'm not only aware of the problem of an educated citizenry as Jefferson was, but I also study trends. One of these is the trend of increasing life expectancy. It has an impact upon the educational process.

Let's be Kelvinian. Let's hang some numbers on what I'm talking about. This is done with the sure and certain foreknowledge that readers who disagree with me, whether it be over my major premise or a minor detail, will probably utilize the most common technique for attacking any scientific or technical hypothesis: Question the adequacy and accuracy of the data source. (Look, some of you out there have done so in the past, particularly when it came to nit-picking and diddly little data bits relating to an interesting concept, the military ratio.)

Give or take a few years, the average life expectancy in the United States today is about 75 years.

A person with a college education spends about the first 21 years of life going to school. Following graduation (assuming the student doesn't go on for a graduate degree), a person has 54 years of life ahead. That's a total of 473,364 hours.

Assuming 8 hours of sleep per night, this leaves 315,576 waking hours available.

Assuming 50 weeks of work at 8 hours per day, 5 days per week, and retirement at age 65, a person will therefore work 88,000 hours. If a person's education has been totally job or profession oriented, this education will apply only to about 18.6% of a life time. This leaves 227, 576 hours of personal time.

Assuming 2.5 hours per day spent eating, we each have 178,267.25 hours of pure leisure time amounting to 37.66% of life after college or 56.49% of a person's waking hours.

What is a person goign to do with more than one third of his/her life after college graduation?

Answer: Most of us raise a family, participate in local civic affairs, carry out the obligations of citizenship, and also find something to do as a hobby for the sake of simply doing it.

I don't recall and I cannot find the source of the remark, "People long for immortality yet don't know what to do

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with themselves on a Sunday afternoon."

(How much NFL football or television can a person watch? More than 150,000 hours?)

Robert Heinlein once remarked to me that most people graduate from school—secondary or university—and promptly proceed to put their brains in deep freeze.

Therefore, our educational theories and techniques today appear to concentrate on the extremes of the process: education to "live life" on one end versus job oriented, almost vocational, training on the other. Neither will produce an individual capable of leading a full and happy life while at the same time being a citizen of the civilization in which he/she lives.

The "live life" education prepares no one to contribute to cultural development. This is an integral part of the process of civilization. The late Will Durant maintained that the key process of civilization is the ongoing matter of building on past successes while avoiding past mistakes. In short, one must pay one's dues. One cannot simply take the civilization as one finds it, use its benefits, and put nothing back into the till. In turn, one cannot contribute thus to a culture if one is not prepared to do something that other people believe valuable. There are many complaints about the inequities in this procedure—rock stars making far more money than the person who discovers a cure for cancer, for example—but, by and large, over the long haul people have shown an encouraging tendency to support things of long-term value. We wouldn't have what we've got today if this were not the case.

On the other hand, job oriented training, even at the university level, prepares a person to practice a profession *as it is known at the time of the education*. A person thus educated is practically an obsolete professional at the instant of graduation. In the first place, except for the basics of the profession, that education is obsolete because text books and professors are usually five to ten years behind the actual applied state of the art, but perhaps not the theoretical side. And, most important, the person's profession will either change so drastically during the working years that the profession istself may become extinct or the person will have to engage in continuing education just to stay even. Sure, it's a Red Queen's Race; it always has been.

Because of the shortcomings of these two extremes of educational practice, a person is not only shortchanged in life but isn't equipped to function properly or effectively in our current fast-moving civilization. Making intelligent decisions either in the polling place or on various social and political committees requires either knowledge beyond the narrow confines of a trade, profession, or job *or* the ability and willingness to go find the necessary new information and change one's mind if necessary.

The most important thing they taught me in a liberal arts and science curriculum was *how to learn* and *how to find information*. I've learned far more since I left college than I ever did while I was there. I graduated with the equipment to be a life-long learner. I'm not any

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smarter than anyone else. I just know how to learn.

We're faced with a sure and certain future that will require continual use of brain power rather than muscle power. This future not only includes an increasing life expectancy, but also the certainly of having 150,000 hours or more of what is known as "leisure time" but should be called "personal time." This is perhaps the first time (but not the last time) in history when so many people have had so much personal time.

What is very worrisome about this future, however, is the average person's inability to happily spend more than half his/her waking life in constructive, creative, imaginative, non-destructive activities. There's an ancient remedy for boredom: create a conflict. As Tom Lehrer puts it, "Something to liven up an otherwise dull afternoon." This was the very solid message of *A Clockwork Orange* by Anthony Burgess. Some observers have theorized that wars are started to divert the attention of the peons from domestic problems. But some wars are started just because people get bored.

And we can't afford to do that any more.

Yes, education is important. But *what kind* of education is also critical to the future. ■

ON GAMING

(continued from page 97)

Sooner or later, your character will die. Within this game, however, death not only isn't final, it can actually be beneficial. It's better to die a hero than to live as a coward, since, if you have passed the tests the game has presented you with prior to your demise, your character will be promoted to the next, more advanced level.

A better, albeit more difficult route to a higher level, is through the icons. Once you've discovered the icon and have aligned yourself with its virtue, you may touch it to pass into the next level. Instead of losing points, as you do when your character dies, you will receive several hundred strength points by satisfying and using the icon.

A final word on death: When your character dies, he is reincarnated as another member of the same family, carrying on the quest. He will not be forced to start over at the beginning level if his predecessor died on a higher level. The character will be reincarnated on the same level. However, all creatures previously faced there will also be replaced, and their locations will have changed. Of course, if a previous character committed some nefarious act or some gross stupidity, the new character may be reincarnated on a lower level. The sins of the fathers are visited on the sons in this game.

Eventually, you will reach the final level of your quest. There you must perform a deed which all of your previous experiences and lives have prepared you for. When that deed is successfully completed, you emerge from the quest, covered with glory.

ICON does an excellent job of capturing the feel of a fantasy quest, requiring mental challenge and physical skill. Its superior graphics, unusual in a game for the IBM PC, do much to enhance this feeling. The only real drawback of the game is that it's available only for IBM compatibles at the present time. If you have access to such a machine, *ICON* is highly recommended. ■

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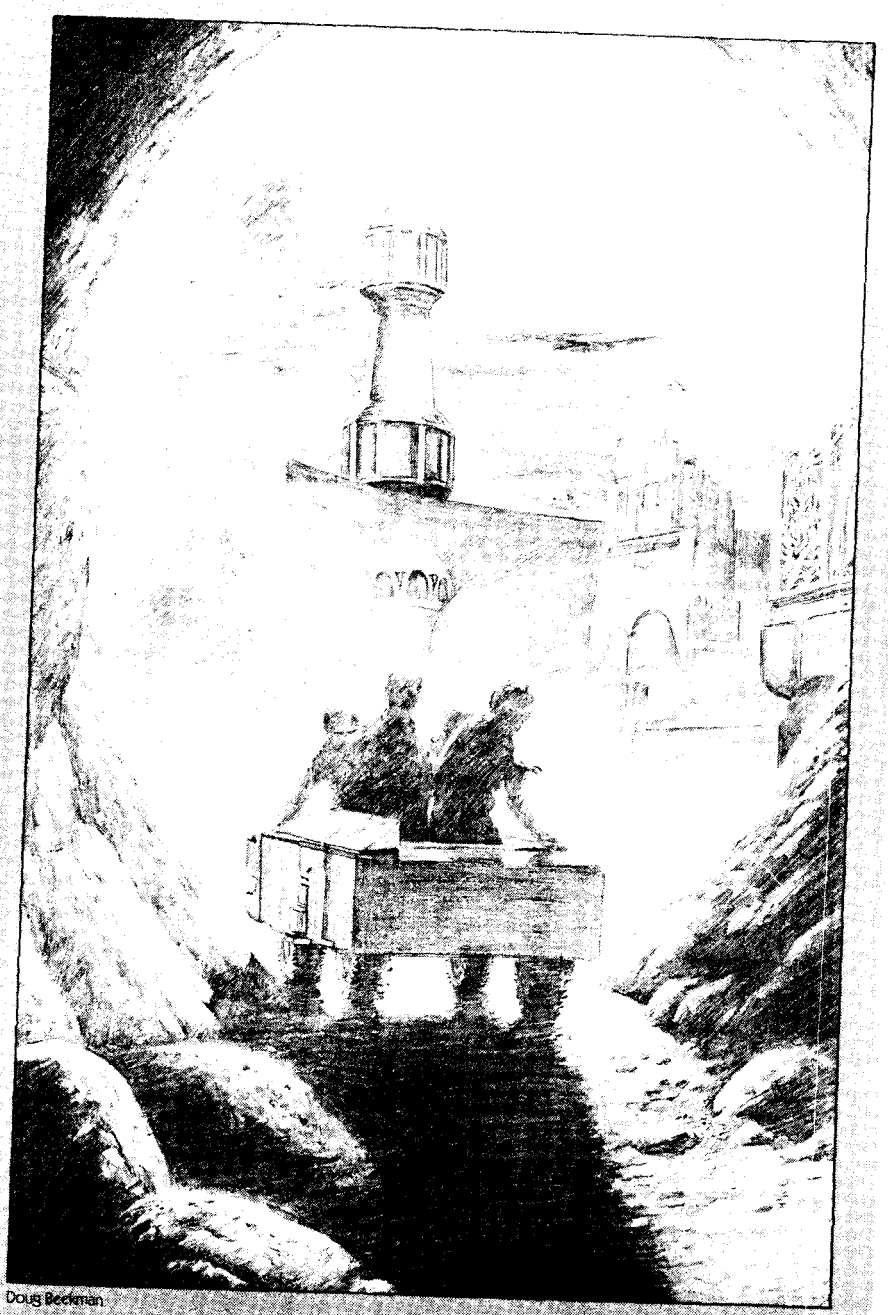

Doug Beckman

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Part Three of Four

SPINNERET

Timothy Zahn

Given a mystery of any depth, a real key to it may at first generate more new questions than answers.

SYNOPSIS

In the year 2015 the United States launched the world's first FTL starships, the **Aurora** *and* **Pathfinder**, *their mission to find new worlds for a crowded and increasingly demoralized Earth to colonize. Their findings were a shock: virtually all oxygen-water planets were already occupied, most of the nearest by one of six different alien empires. One of those races, the* **Ctencri,** *made quick contact with this newcomer to interstellar travel; through them, UN Secretary-General* **Hammad Ali Saleh** *learned of one world which might be for sale or lease. Located within the boundaries of* **Rooshrike** *territory, the planet was considered useless because it contained no detectable metal whatsoever. Saleh persuaded the rich nations to help fund a colony there, while Soviet goading of U.S. President* **John Allerton** *resulted in Allerton's accepting a UN mandate for the development of the new world.*

Ten thousand American scientists, soldiers, and workers were the first colonists to move into the four hastily constructed villages on the world now known as **Astra**. *Among them were the colony's director,* **Colonel Lloyd Meredith;** *a civilian worker on his organizational staff,* **Carmen Olivero;** *a geologist,* **Dr. Peter Hafner;** *and a Hispanic activist,* **Cristobal Perez.**

From the very beginning the colony was beset by disasters. On the colonists' first full day on Astra one of their three Ctencri-built flyers abruptly lost all power in its plasma-jet repulsers and crashed just south of **Mt. Olympus,** *a dormant volcano about thirty kilometers east of the colony. Then, later the same day, a confrontation between some of the predominantly Hispanic field workers in the farming village of* **Ceres** *and the military authorities there was broken up by stunner fire ordered by the local commander,* **Major Dunlop.** *Meredith was furious at his subordinate's quick use of force and took a team to Ceres to investigate. Perez, mistakenly labeled as one of the mob's leaders by Dunlop, refused to talk to Meredith, but was more open in private conversation with Carmen, who had come with Meredith's investigative team. She was stunned by Perez's allegations that*

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many of the Hispanics had been lured into joining the expedition by unfair promise/pressure tactics back on Earth, but simultaneously annoyed by his veiled threats of more trouble if some of the restrictions of military rule weren't eased. Still, in talking later to Meredith, she suggested that he set up a civilian advisory council to give at least the illusion of democracy to the colony. He refused, but agreed to address other issues of unfairness Perez had raised.

The next day's work had barely begun when an unexpected visitor arrived: **Beaeki nul Dies na,** *one of the Rooshrike from whom Astra was being leased. Meredith gave him a tour of the colony, learning a little about the six-race—or seven, counting humans—trading association in the immediate area. He also learned the Rooshrike maintained a mining base on the hot innermost world of the system and suggested the aliens might want to purchase some of Astra's sulphur once production began. Beaeki promised to pass on the suggestion and left.*

As the first week passed and tensions re-emerged Carmen again began pushing her Council suggestion; but this time she received unexpected support. Hafner, trying to get a flyer to do studies on the Mt. Olympus volcano, agreed to try and build support for the plan among Astra's scientific community in exchange for Carmen's help in getting flyer priority. Meredith, succumbing reluctantly to the added pressure, allowed the Council's formation—but placed Carmen in charge of it, all organizational work to be done in off-duty hours. Perez, pleased that his nudges had borne even limited results, succeeded in gaining one of the Council's ten seats.

Keeping her promise to Hafner, Carmen flew him herself to Mt. Olympus, but the results of his study merely deepened the mystery of how an entire planet could form with no metallic elements in its crust.

And then, a month later, all semblance of normalcy abruptly disappeared. In a single afternoon all metal in contact with Astra's surface simply vanished, melting into the ground as if into quicksand. The effect lasted three hours and ended as suddenly as it had begun.

For the already financially strapped colony, the loss of so much equipment was a thorough disaster. Meredith debated with his senior officers about whether or not they should close down the colony and return to Earth, citing in particular the loss of vital trace metals from the fertilized fields. Hafner, describing various geological findings, suggested that the "leeching effect" had occurred several times throughout Astra's history and was, moreover, tied somehow to the mysterious Mt. Olympus. Meredith gave his permission for an expedition to study the volcano, and dawn the next morning found Hafner, Perez, and three others climbing up the slope, while Carmen and one other waited below in their flyer.

But halfway up they suddenly realized that, inexplicably, gravity seemed to be decreasing. Air rushing past them, they headed back down . . . only to find their way barred by a region of heavy gravity that threatened to crush anyone who crossed it. Using the flyer's compressed oxygen supply, Carmen was

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able to keep them alive . . . and just before the gravitational anomalies went back to normal they all watched as a long silver thread was shot from the volcano into space.

Matching orbits with the six-centimeter-diamter cable, the Aurora *discovered it to be a mass of physical impossibilities. Incredibly strong but less dense even than water, superconducting of heat and electricity even at high temperatures, the cable was in addition coated with a sort of "glue" which penetrated several centimeters into any object that touched it. Ordering the cable parachuted back down to Astra, Meredith sent the* Aurora *back to Earth with news of the discovery.*

President Allerton, immediately recognizing the political as well as scientific ramifications of the report, ordered a team of scientists to be immediately flown to Astra to begin a study of the cable. Saleh, contacted at the UN, confirmed Allerton's fears by hinting the Astran Mandate might be taken back and the alien machinery—dubbed the **Spinneret***—put under direct UN control. Since the UN Secretariat was in charge of all trade with the Ctencri, the threat wasn't one to be taken lightly.*

The secret didn't last long. The Ctencri trade representative, learning about the Spinneret through bugs in Saleh's office, spread the word to the rest of the nearby races, planning to gain agent status for any sales that would come from new technology.

The **M'zarch** *race took a less subtle approach. Assembling a three-ship task force, they headed for Astra. Arriving just in time to chase away the Rooshrike Beaeki nul Dies na—who had been coming to discuss the cable with Meredith—the M'zarchs landed troops and called for the humans' surrender. Their attack was repulsed with the help of a Rooshrike force summoned by Beaeki, a force which then proceeded to take up defensive positions around Astra.*

The other races lost no time in reacting to the M'zarch attempt. In quick succession the **Whissst,** *the* **Orspham,** *the Ctencri and the* **Poms** *each sent warships or trading vessels to Astra with offers of both defense and merchandise credit. And on Earth, Saleh ordered an international team to the colony to take charge of the Spinneret studies.*

On Astra, however, an increasingly protective attitude was growing toward the Spinneret, culminating in a Council resolution to bar all non-Astrans from examination of the Spinneret cable. Meredith had no intention of accepting that recommendation; but when the UN-sponsored team arrived, he used the resolution as an excuse to deny them access. In doing so he made an enemy of **Ashur Msuya,** *the anti-West UN official Saleh had chosen to lead the delegation.*

But Msuya's threats of economic sanctions were something to be taken seriously, and Meredith began negotiations with the Rooshrike to establish a secure supply line, offering lengths of Spinneret cable as payment. Perez, thinking along similar lines, began wondering how many new citizens Astra could absorb as cable money began to come in—and what sort of employment he could offer newcomers with Astra's restricted job opportunities.

And then Hafner, searching in some hills several kilometers south of Mt.

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Olympus, found a buried door, almost certainly the long sought-after way into the Spinneret machinery. With only a little effort, the door was opened.

PART THREE

"Get down!" Meredith snapped. Hafner, backing rapidly out of range of the huge panels, was yanked down into a crouch by a nearby soldier. Behind the doors was a dark tunnel that seemed to angle downward. Nothing moved back there, at least not that Hafner could see from his angle, and for a moment he considered standing up and telling Meredith there was no danger. But the soldier still had a solid grip on his arm, and with a mental sigh he resigned himself to waiting.

He hadn't noticed the faint sound of a motor until it cut off into silence, leaving the doors standing parallel to each other like extensions of the tunnel's walls. From somewhere behind him a car-mounted searchlight probed the gloom, reflecting briefly off of dull metal as it danced around.

"All right, everyone; at ease," Meredith called. The hand on his arm loosened, and Hafner stood up, turning to face the colonel. Only then did he see the double semicircle of soldiers behind him, their weapons only now shifting away from the tunnel mouth as they rose from prone and kneeling firing positions. *My Lord!* he thought, his hands starting to tremble. *What if the Spinners had left something behind to greet visitors? They would've cut it in half!*

"So. Even their doors still work," Meredith commented as he came to Hafner's side. "Smells sort of strange."

Skin crawling with the thought of the guns at his back, Hafner took a step nearer the tunnel and sniffed. "Probably just *very* stale air," he said. "I've opened caves on Earth that were a lot worse. We can do an analysis, though, if you'd like."

"Please." Meredith stepped to one of the doors and began studying the inside surface. Easing his way past the soldiers, Hafner went to get his air-test kit.

The smell was already dissipating by the time he was set up to begin, and a fast check showed that the air composition was indeed basically Astran normal. "Some trace things that look like metal oxides and a slightly higher concentration of radon gas are the only anomalies I get," he told Meredith. "There *could* be alien bacteria, I suppose; we don't have the equipment to test for organic contaminants."

"Given the rest of Astra, I don't think that's a real danger," Meredith countered dryly. "All right. Let's go see what all the Spinners left us." He gestured toward Major Barner and started back toward the cars.

"Just a moment, Colonel." Hafner stopped him. No telling how Meredith would take this, but Hafner's conscience demanded he bring it up. "How many of these soldiers were you planning to take in?"

Meredith cocked an eyebrow. "Three squads—that's thirty men. Don't worry; I'm sure they can handle anything we run up against."

"Exactly my point. They'll handle things, whether those things actually need handling or not."

The colonel frowned. "What?"

"I doubt very seriously if there's any-

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thing dangerous in there, provided we keep our hands off any equipment," Hafner said. "I'm more worried about someone shooting up something irreplaceable because it reflected a flashlight beam back at him."

"Come on, Doctor—my men aren't that trigger-happy—"

"Furthermore, I think this is the right moment to set a precedent here." Hafner waved at the tunnel. "If we want the other races around us to treat the Spinneret as a peaceful manufacturing device, we've got to make it a *civilian* matter right from the start. You put soldiers inside here and everyone's going to jump to the wrong conclusion."

"You're oversimplifying," Meredith said, with obviously strained patience, "not to mention anthropomorphizing. At least two of the species out there don't seem to even *make* a distinction between military and civilians."

"Then let's do it for ourselves," Hafner insisted. "*We* make that distinction, and so do all the people back on Earth. In the UN, for instance."

Meredith gazed at him for a long moment, and Hafner wished he had some clues as to what the other was thinking. Certainly the geologist's personal leverage and influence were very near zero, a fact Meredith obviously knew as well as he did. His only chance was that the colonel might somehow glimpse the various political consequences involved here—consequences Hafner himself only dimly understood—and make his decision appropriately.

And apparently he did. "All right," Meredith said at last, his eyes flicking back toward the troops. "The military presence will be limited to Major Barner and myself. I trust you won't mind if I have a defensive perimeter set up out here?"

The last was definitely sarcasm, but Hafner didn't care. "No, that'll be fine."

"*Thank* you." Quickly, the colonel issued orders: he, Barner, Perez, Hafner, and Hafner's assistant Nichols would go inside for a fast look around. All would be equipped with emergency packs; Meredith and Barner would be armed as well with stunners and dual-clip pistols. There was some discussion as to whether or not to take a car inside, but the vehicle's ability to carry extra equipment eventually tipped the balance against the traditional military dislike for bunching up. In addition, Barner would wear a medium-range radio headset.

"We'll stay in continuous contact as long as possible," Meredith told the captain being left in charge of the Crosse contingent. "Don't worry if we fade out, though, because these walls will probably cut off the signal long before we get to the end of the road. If we're not back in four hours contact Major Brown at Martello for instructions and assistance." Climbing into the front passenger seat, the colonel glanced at the others: Barner, Perez, and Hafner squeezed together in back; Nichols at the wheel. "Everyone set? Okay, Nichols; slow and easy."

The young geologist eased the car into the tunnel and started forward. Hafner discovered he'd been right; the floor *did* angle a couple of degrees downward. He was leaning forward, eyes searching at the limits of the car's head-

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lights, when the tunnel abruptly blazed with light.

Nichols slammed on the brakes, and Hafner heard the double click of two pistol safeties. For a moment there was a tense silence, but as Hafner's eyes adjusted to the light he saw that the tunnel was still empty.

"Automatic," Barner muttered. "We hit the Spinner version of a welcome mat and they turned the lights on for us."

"Yeah." Meredith seemed to take a deep breath. "Well. Nothing seems to be threatening us at the moment. Let's keep going."

Nichols got the car moving again, and Meredith craned his neck to look at Hafner. "Doctor, you quoted me a time of a hundred thousand years once for how long the Spinneret had been operating. Does the length of time this entrance has been covered up correlate with that number?"

Hafner shrugged as best he could, squeezed as he was between Perez and the right-hand door. "I really couldn't say for sure. We still know next to nothing about Astra's climatological patterns, let alone the erosion and compacting rates for many of the minerals here. I'd guess we're still talking in the tens to hundreds of thousands of years."

"Does it matter?" Perez put in. "It doesn't seem all that different to me whether a piece of equipment lasts a thousand years or a million."

"The difference—" Meredith broke off. "Never mind. Is that a door off to the left up there?"

It was indeed a door, one as tall as the outside entrance and nearly as wide. "Looks like it slides open instead of swinging," Barner commented as they climbed out of the car.

Hafner nodded; he'd already noted the lack of visible hinges and the way the door was set back instead of being flush with the tunnel wall. "If you all want to stand back, I'll see if that plate in the center works the same as the one outside did."

This time there was no sand gumming up the mechanism, and it took only a moment for Hafner to discover the eye-level design needed to be pushed in instead of rotated. As the door slid smoothly into the wall a set of interior lights came on, revealing a vast, empty-looking room.

"Looks like a high-school gymnasium," Perez commented as the others joined Hafner. "Floor markings and everything."

"You'd never play basketball here, though," Hafner muttered, eyeing the four-meter-high ceiling.

Nichols had taken a step into the room. "Boxes off in the corner, Dr. Hafner," he announced, pointing.

"Where?" Meredith asked, moving alongside. He still held his pistol loosely in his hand, Hafner noted with some uneasiness. ". . . Ah. Interesting." The colonel looked at the opposite side of the room, then back to the boxes. "Yes. See how they're not really arranged in rows? If the floor pattern's symmetrical on both sides, it looks like they're set out along one of the French curves back there."

"Odd," Barner murmured. "Some sort of giant board game, you think?"

"Not necessarily," Meredith said.

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"It could just be their method of storing supplies."

"Seems like that would waste a lot of space," the Major said.

"Even if you had them in rows you'd need room for ventilation and forklift maneuvering," Meredith pointed out. "And as for identification purposes, a row number plus pallet number is no simpler than a curve number plus distance along it. I understand in some parts of Japan they still use a similar system for addresses."

Hafner found himself staring at the elaborate floor pattern, trying to visualize a race that would rather think in curlicues than in straight lines. *Do the Rooshrike do things that way?* he wondered suddenly. *Might be worth finding out.*

"Should we open one of the crates up, see what's inside?" Nichols asked.

"Not now," Meredith said, turning back toward the car. "The follow-up teams can handle details like that."

They passed several more of the storeroom-type doors in the next two or three kilometers, Meredith vetoing any suggestion that they be examined for contents. "It's obvious that what we've found is a freight entrance and storage area. Interesting, but not nearly as important as the control room for the Spinneret machinery."

"Just out of curiousity, Colonel," Perez spoke up, "what exactly do you propose to do if and when we learn how all this is done?"

Meredith turned halfway around to look at him. "For starters, I'd like to either shut down or drastically restrict the metal leecher—our attempts at agriculture are going to be limited to hydroponics if we can't do that. It might also answer some questions if we found out whether six-centimeter cables are all the Spinneret can produce, or whether we can make plates of the material as well. Why?—did you have some project of your own in mind?"

"I'm wondering about the basic science involved," Perez said. "Are you going to offer the gravity nullifier for sale, too, for instance?"

Nichols caught the key word before Hafner did. " 'Too'?" he put in before Meredith could answer. "What's going on? What are we selling?"

"We're putting Spinneret cable on the market," Meredith said—rather grudgingly, Hafner thought. "It's not a secret, exactly, but we weren't going to say anything to the rest of the colony until we'd settled with the Rooshrike on terms and prices."

"The Rooshrike?" Hafner frowned. "I thought the Ctencri handled all trade with Earth."

"They do," Meredith said. "That's one of the reasons we're going through the Rooshrike."

Hafner thought about that for a long moment, not liking any of the implications that came with it. Clearly, important things had been happening while he'd been occupied with digging up the Astran landscape; just as clearly, Meredith wasn't interested in giving out details. He wondered if Carmen knew what was going on, and made a mental note to get in touch with her as soon as possible.

"But as for the gravity nullifier and leecher," Meredith continued, "that technology is staying on Astra. Period. Unless you have objections?"

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"None at all," Perez answered. "Though I would actually go further and say we shouldn't even study the equipment too closely. The minute you begin to store such knowledge you invite its theft, and we can't afford to lose Astra's secrets."

"I expect Drs. Hafner and Nichols would take a somewhat dim view of that philosophy," Meredith ventured. "Or would the scientists here be happy working with a machine that's running on black magic?"

Hafner's inner ear signaled a change in direction. "We've leveled out," he announced, glad of an opportunity to short-circuit the argument. "I think I see a cross corridor up there, too."

"You do," Meredith confirmed, craning his neck to see the car's odometer. "About six kilometers from the end . . . puts us something like one to two hundred meters underground. Hm. Odd that the Rooshrike metal detectors didn't pick up the place; they're supposed to have a half-kilometer range."

"Maybe it's all made of the same stuff as the cable," Barner suggested. "That doesn't register well on detectors, remember."

"Won't work," Hafner said. "Cable metal's fine for structure and power cables, but the electronics have to use normal metal."

"Why?" Perez asked.

"You need both normally conducting metals and semiconductors for any kind of electronics," Hafner told him. "Cable metal either conducts perfectly or terribly. More likely the walls here shielded the electronics in some way."

They'd reached the cross corridor now and, on Meredith's orders, Nichols brought the car to a stop. "Anything look interesting in either direction?" the colonel asked, sending his own gaze back and forth.

"Looks like the hall just dead-ends at a single big door on this side," Barner reported.

Hafner leaned forward to look past Perez. Sure enough, it did . . . and suddenly he had an idea what they'd find behind that door. "Let's take a look," he suggested.

Meredith shot him an odd look over the front seat, but nodded. "If you think it's worth doing. Major, how's contact holding up with the outside world?"

"It's been fading steadily, but we've still got them."

"Warn them we'll be moving in and out of corridors from now on and likely only have erratic contact. All right, Nichols; drive us over there."

Hafner's hunch proved to be correct. Behind the door was another corridor, parallel to the entrance tunnel and with perhaps four times its cross section. Mounted up off the floor, disappearing away to infinity in both directions, was a huge solenoid.

"A particle accelerator?" Nichols whispered as they stood and stared at the monster coil.

"Who knows?" Hafner shrugged. "All we know for certain is that it knocks out repulser plasmas."

Meredith muttered something; apparently, he hadn't made the connection. "You mean some sort of resonance effect with this thing is what wrecked our flyers?"

"Or with one of the pieces of equipment you can see hooked into the solenoid in places," Hafner said. "Must

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be a tremendous field inside the coil if the stuff that leaks out is that strong."

"Wonder what it's for," Barner said. "Any ideas?"

"Could be practically anything." Hafner shook his head. "This whole place is incredible. Why on Earth would anyone go to the trouble to build something like this?"

"Maybe it was their normal mining method," Perez suggested. "This is impressive, certainly, but so are off-shore oil rigs and the Exxon Tower."

"Then where's the rest of their civilization?" Nichols objected. "They should've left *some* other traces behind."

"After a hundred thousand years?"

"We find fossils older than that on Earth."

"Actually, the Spinners probably weren't native to this system," Meredith interjected. "Possibly not to this entire region of space. Let's get back to the car and move on."

"What's your evidence the Spinners were strangers here?" Perez asked when they were again driving down the main tunnel. "Lack of fossils hardly counts —nobody's really been looking for them."

"How about lack of other cable-material structures?" Meredith countered. "Not just here, but elsewhere in the system? Remember, the Rooshrike did a pretty complete survey of this place when they first ran across it. Besides, if they lived anywhere near here they ought to at least be hinted at in Rooshrike archaeology or legends."

"Maybe they are," Hafner said. "Stories of godlike creatures and all could be references to them."

"The computer doesn't think so. All the appropriate mythological figures are too similar to Rooshrike themselves to be aliens."

"But after several thousand retellings—"

"Hold it!" Barner barked, cutting Hafner off and causing Nichols to stomp on the brakes. "On the right, down the corridor we just passed—looked like a hole in the rock."

Nichols backed the car up the necessary few meters and turned off to the right. Hafner leaned forward, peering over Meredith's shoulder. Sure enough, where the metal walls and lights ended, the tunnel continued on. "You've got good eyes, Major," he commented.

"They're no better than yours," Barner replied, a bit tartly. "I just use mine, that's all."

Hafner reddened and shut up.

The corridor ended in what had once been a T-junction with another hallway; the rough tunnel Barner had spotted led through the crossbar of the T, as if someone had planned to extend the corridor and never completed the job. "Sloppy work," Nichols commented, running his fingers over the rough stone within the hole. "Must've had their funding cut."

"I don't think so," Meredith said. "Note that the whole wall's been left open to the rock here, as if they'd *planned* to drill into it."

Hafner stepped back and looked down the hallway. "You're right—looks like another hole down there, just past that vertical support bar."

Meredith produced a flashlight from his pack and aimed it into the tunnel. "Goes pretty deep . . . well, well. Looks

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like there's something metallic back there." Shifting the light to his left hand, he ducked his head and stepped carefully into the passageway. "Everyone wait here and keep your eyes open. I'll be back in a minute."

It was more like five minutes before the colonel reappeared. "Well?" Perez demanded as Meredith put away his light.

"Hard to be sure, of course, with an alien design," Meredith said, "but the thing back there seems to be an automated digging machine."

"So they *were* extending this tunnel," Nichols said.

"Or else mining the rock for the nonmetallic elements the leecher doesn't get," Hafner suggested. "Maybe hauling the digger out would give us a clue."

"I wouldn't recommend that," Meredith said. "The thing's still active."

They all turned to face him. "It's *what?*" Hafner said, cocking an ear toward the tunnel.

"Oh, it's not actually running—there's a rock jammed between two of the track links. But there's something that looks like a display panel in the rear, and a half-dozen lights are still showing on it." Meredith brushed at the dust that had collected on his shoulders and headed back toward the car. "Come on; let's keep moving."

They returned to the main corridor and continued on inward, driving for the most part in silence. It shouldn't have been such a shock, Hafner told himself—they all knew, after all, that the main Spinneret machinery was still operational. Somehow, though, he'd always pictured the Spinneret as an essentially solid-state apparatus, barely surviving through the grace of multiple redundancies. For a small peripheral unit—and a *tunneling* machine, at that—to be in equally good shape was both awesome and just a little bit creepy.

The corridor made a thirty-degree angle to the left . . . and without warning, they were abruptly in a new world.

"Snafu on toast," Barner gasped, craning his neck to look up. "What the hell *is* this?"

Chapter 18

Like Barner, Hafner's eyes were drawn first upward, to the impossible blue sky overhead. Fluffy white clouds drifted visibly by, occasionally cutting across the shining yellow sun midway to zenith . . . it was nearly a minute before he could tear his gaze away and focus on the village scene around them.

His immediate impression was that they'd driven into a copy of Jerusalem's old city. White-walled, dome-roofed buildings squeezed closely together along narrow, winding streets, while in the near distance a decorative wall cut in front of a minaret-like tower. A closer look, though, showed him the myriad of architectural differences between these buildings and anything he'd ever seen on Earth. The shapes and positioning of the windows, the elaborate carvings on doors and archways, even the faint iridescence of the walls themselves all emphatically marked the place as *alien*.

Perez broke the spell first, with a murmured Spanish phrase that sounded simultaneously blasphemous and awestruck. "This is impossible!" he whis-

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pered. "The sky—but we were a hundred meters underground!"

"It's artificial," Meredith said, and Hafner had to admire the confidence in the other's voice. The geologist had stared at the sky for an entire minute without finding any flaws in the simulation. It *was* a simulation, of course; it *had* to be. "Probably a hologram or something projected on a domed ceiling," Meredith continued. "Looks like the Spinners were settling in for a long stay here."

"But why underground?" Perez asked, clearly still shaken. "Why not on the surface where they could have *real* sunlight?"

"Probably wanted a place where they could burn their steaks in peace," Nichols said, sneezing violently. "Or can't you smell that mess?"

Hafner sniffed cautiously. He hadn't really noticed the odors drifting in on the breeze, but now that he was paying attention he discovered Nichols was right. A faint smell that indeed resembled burnt meat was dominant, but beneath it he could detect traces of jasmine, sulfur, and something like a cross between rusty iron and oregano. "Whooee," he said. "Smells like someone burned down a kitchen pantry."

"Again, probably artificial." Meredith pointed to a bare patch of ground Hafner hadn't noticed. "I'd guess that used to be a garden or small park. You can see that whatever used to be there is long gone. Anything that could possibly have decayed did so centuries ago."

The wind died and began again from a slightly different direction, changing with equal subtlety the mixture of scents. Hafner glanced upwards; the phantom clouds, too, had shifted direction. "Someone went to an awful lot of trouble to make the workers feel at home."

"Yeah." Meredith pointed toward the minaret in the distance. "Let's leave a marker at this entrance and head over toward that tower. I want a look at that wall, too."

Barner produced a fluorescent orange-and-pink stick-on from his pack and got out of the car. Peering ahead, Nichols sneezed again and shook his head. "I don't understand why they'd bother putting in any walls down here," he said to no one in particular. "What would they want to cut this place in two parts for?"

"It may be simply decorative," Perez suggested. "Or possibly it separates the laborers from the elite."

"Or," Meredith put in, "it could have had a genuine defensive purpose. And if so, we'd better find out fast what they were defending against." He glanced back as Barner climbed into the car, nodded to Nichols. "Let's go, Doctor. Take it *real* slow and easy."

It was, Perez decided, the ultimate ghost town, raising boyhood memories he'd have preferred to leave buried. Many of the buildings they drove past had open doors, and he found himself peering nervously into each one as they passed, half expecting some lone survivor of the mass exodus to charge out at them. Originally, he'd applauded Hafner's stand on military participation in this trip; now, he almost wished Meredith had brought those three squads along.

Hafner, at least, seemed to feel some

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of his same uneasiness. "Looks like they left in a hurry," the scientist murmured, gazing out his window. "A lot of doors and windows were left open."

"Why lock them?" Barner asked reasonably. "Unless they imported their own burglars, too—"

"They also left the Spinneret running," Hafner pointed out.

Barner shrugged. "You leave a fluorescent light on if you expect to be right back."

"Yeah," Meredith agreed. "So . . . why *didn't* they come back?" Tapping Nichols on the shoulder, he pointed ahead. "There; on the left—that wide spot in the road. Pull over there and let's take a look inside one of these houses."

Nichols did as instructed and they all piled out. The building by the parking space was larger than the ones immediately around it, with inset doors and an archway extending almost to the street. "I'm going inside," Meredith said in a low voice, drawing his pistol. "Major, you and the others stay here. Are we in contact with the outside at the moment?"

"No, sir," Barner replied. He, too, had drawn his pistol.

"You still at quarter-power setting?"

"Yes."

"All right. I don't expect to run into any trouble, but if you hear a shot and I don't check in within a ten-count, boost power all the way up and call for assistance. If the snoopers overhead hear . . . well, at that point we've probably got worse worries."

Barner nodded. "Understood. Good luck, Colonel."

"Thanks." Meredith stepped under the archway, pausing as Perez joined him. "What do *you* want?" he growled.

"I'm coming with you," Perez told him calmly. "If you think there's possible danger in there, two would have a better chance than one. And you have to admit I'm the most expendable man here."

Meredith snorted, but waved his pistol impatiently. "Oh, all right. But don't touch anything, and if I give you an order you hop. Got it?"

"Got it."

The door had seemed closed from the street, but the leftmost of the twin panels actually turned out to be ajar. Meredith halted there, spending nearly a minute examining the entire area before easing it open. Motioning Perez to stay put, he stepped over the sill and disappeared off to the right. A moment later his beckoning hand appeared. Wondering belatedly if his curiosity hadn't perhaps gotten him in over his head, Perez gingerly stepped inside.

They were in a large room, lined on all sides with floor-to-ceiling shelves. Unrecognizable objects rested on some of them, uniformly coated with dust. Directly across from them a wider chest-high counter replaced one of the shelves, its surface showing more wear than Perez had noticed anywhere else. He pointed that out to Meredith, who nodded. "Yeah. I thought at first this whole place was built out of painted cable-type metal, but it's looking more like we've got some sort of ceramic here, maybe over a cable-metal frame." He glanced to either side, perhaps at the two closed door exiting from the room, and then walked over to the counter. Trying to

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watch both doors at once, Perez followed.

"The floor looks a little more scuffed here," Meredith said. He touched the edge of the countertop experimentally, exerted some pressure—

And with a *crack*, a section several centimeters long disintegrated into a cloud of white dust.

Perez clamped his mouth hard over the exclamation that wanted out and backed hastily away as the cloud drifted toward him on the eddy breezes. Meredith had dropped into a crouch, pistol at the ready. Perez held his breath, listening, but he heard nothing.

"I was right," Meredith stage-whispered a moment later, straightening up and brushing the remnants of the ceramic off the dull metal edge beneath. "Cable metal, almost certainly."

"Uh-huh," Perez nodded. He glanced around the room. "You suppose this place was a store or something?"

"A store, or a fast-food restaurant or bar," Meredith murmured. "Maybe the Spinners like to stand up while eating. Let's check out those other doors—and keep your voice down, huh?"

"What exactly are you worried about running into here, anyway?" Perez asked. The crumbling of the countertop had put his ghost town fears back into perspective, reminding him once more how old this place was. Even ghosts disappear after a few centuries.

"It occurs to me," Meredith replied, "that there's another possible reason the Spinners might not have worried about leaving their doors open: they may have had some very good anti-burglar equipment."

"After all these years—"

"The digging machine was still functional."

Perez swallowed. "Right. Well . . . nothing's attacked us yet."

"Yet," Meredith echoed. "Let's check out those doors and then move on. I don't think we're really going to find anything in this part of town."

They were halfway across the room when Meredith's short-range radio beeped quietly. "Meredith," the colonel answered. ". . . Where is it?"

Perez stepped to his side, close enough to hear Barner's voice. ". . . dred meters away and closing. It's not terrifically fast, but it may be armed."

"Yeah. Pull back as quietly as you can; let's see if it's us the thing's after." Meredith moved to the front door, sent a quick glance outside. "Looks like the basic structure's cable metal," he said, stepping back again. "Perez: check out that door. See if it leads outside."

Perez broke his paralysis and tiptoed to the side door. Opening it, he found another room, much smaller than the first one but equipped with the same sparsely-laden shelves. There were no doors, but one of the windows facing the street looked big enough to get through quickly. *If we can open it,* he added to himself, sidling along the wall to check. Keeping his head low, he reached up to try and find a latch . . . and as he did so, he got his first look at the machine bearing down on them.

It was as if someone had built a giant mechanical spider, fitted it with a turtle shell, and grafted a nest of snakes on top of the result. *A walking Gorgon's head,* Perez thought, suppressing a shudder . . . and it *was,* indeed, heading for their building. Across the street,

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he caught a glimpse of Barner and the others crouched beside one of the other houses.

"Perez!"

Perez jerked violently before his brain could register the fact that the stage whisper from behind him was Meredith's. "It's coming, Colonel," he breathed. "I can see it!"

"I know, but we've got at least a minute before it gets here. Does that window come open?"

Perez's hands remembered their task. "Uh . . . I think I feel the latch here . . . there. It moved about a quarter turn." He glanced cautiously out again. "I'd rather not try pushing it just yet."

Meredith was crouched beside him now, fingering the window himself. "Yeah . . . well, we'll just have to hope it's not stuck." He raised his radio. "Major, the minute it's inside here I want all of you in the car ready to take off. No covering fire unless it seems necessary; the last thing we want is to attract any more of them." He got an acknowledgment and slid the radio back into its pocket. "Wait here," he told Perez. "When I fire, shove the window open and get out. If it sticks, hit the floor and yell and I'll try an armor-piercer on it."

Perez nodded silently, and Meredith moved back across the room. Closing the door to a crack he stood peering out, his pistol held tightly at the ready in a two-handed marksman's grip. Perez bit at his lip, staring at the gun and hoping the colonel hadn't wasted any of the six spots in his number-two clip on flare shells or something equally useless. *Though will even armor-piercers do anything against cable metal?* he wondered suddenly. *A vulnerable spot—there has to be a vulnerable spot for him to hit—*

From the other room came the *clip-clip-clip* of metal feet. Perez caught his breath . . . and Meredith fired.

The blast of the shell was deafening in the enclosed space, its echoes almost drowning out the sounds of Meredith's next two shots. A snowstorm of ceramic dust erupted from the walls and ceiling as the building shook to the explosions. Perez threw one arm up to protect his eyes from the dust as he stood and shoved with his full weight against the window. It held an instant and then gave with a screech. Grabbing the edge, Perez vaulted through, banging his shoulder in the process and nearly losing his balance when he hit the ground. Meredith was right behind him, giving him a shove in the proper direction and shouting something he couldn't catch. Running full tilt, he got his eyes clear of dust and tears just in time to skid to a halt by the open car door and dive into the back seat beside Hafner. Meredith hit the front seat an instant later, and Perez was abruptly jammed into the cushions as Nichols stomped on the accelerator. The car jumped ahead, throwing Perez back and forth as Nichols fought to keep the car on the winding street.

"You all right?" Meredith asked.

"I think so." Perez fished out a handkerchief and wiped his eyes. There was a grunt from the other side of the car, and he looked up to see Barner slide awkwardly in through the window, where he'd apparently been sitting in rear-guard position.

"As far as I could tell it never fired

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a shot," he said, twisting to look out the back window.

"I'm not sure it wasn't for lack of trying," Meredith replied grimly. "At least two of those snakes were tracking me from the second it came through the door."

Barner grunted. "You get it?"

"Wasn't trying to. I was firing at its feet, trying to knock it over long enough for us to get out."

"Maybe all the dust helped, too." Barner turned back to face forward. "The local police force, you suppose?"

"Or else a burglar alarm," Hafner offered.

"Burglar alarms are usually set up in the individual house," Perez said, coughing ceramic dust.

"*Ours* are," Hafner said. "But the whole setup of this town seems pretty cozy by human—well, at least by Western culture standards. It's quite possible that a gregarious people like the Spinners would go with a centralized burglar-proofing system."

"A police force by any other name." Barner dismissed the distinction. "And the real question then is how many more of them are still functional."

The car hit a tight curve and fishtailed a bit getting around it. "I think you can slow down now, Nichols," Meredith said.

"Yeah. Okay." Nichols threw quick glances in all directions before somewhat reluctantly easing off the gas. Perez stared hard at the geologist, wondering at how shaken the other seemed over the incident. Only gradually did it occur to him that he'd been too busy himself at the time to consider what the Gorgon's Head might have done. . . .

* * *

The unfamiliar architecture and geography of the Spinner cavern made distances deceptive, and it turned out that the wall was both farther and higher than it had looked from the tunnel entrance. Rising a good six meters above them, its surface an intricate pattern of subtle colors, it was as if a hundred rainbows had been caught and smashed together into the leading edge of a glacier. Meredith grimaced; the image was an oddly unsettling one.

"Well, Colonel?" Perez prodded from behind him. "Was it for defense or not?"

Meredith let his eyes rove the wall's length. No crenels or loopholes for gunners to shoot through; no towers or turrets, nor any indication the wall had ever had them. "If it was, it was an extremely passive system," he said. "Regardless, we've got to get through it. Anyone see anything that looked like a break or gateway on our way in?"

"I thought I saw a gap over to the left," Barner offered, frowning off in that direction. "But I can't find it now."

"Maybe the color pattern's hiding it," Meredith suggested. "Let's go take a look."

They piled back into the car; and barely fifty meters away they found the tall, thin opening Barner had seen.

"Wouldn't have believed a simple hole could be that hard to see," Barner grunted, leaning through the gap for a quick look at the other side. "Well . . . it's a cinch we're not going to get the car through here, Colonel, but the tower looks to be only a ten-minute hike away."

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Meredith motioned him aside and stepped through the opening himself. Unlike the other side, this part of the cavern was nearly devoid of structures. Those he could see looked less like houses than industrial or business buildings: long and low, with little of the decoration they'd seen on the domed homes behind them. *Or they could be the town cafeteria and rec centers,* he reminded himself. *All the vacant ground could have been gardens or a forest. In which case the tower would have been . . . what?*

The tower. It rose up from the ground perhaps half a kilometer away, looking rather like a cross between a church spire and an airport control tower. About fifty meters tall, he estimated, with what looked like wide windows halfway up and also near the top. A half-dozen flat-roofed buildings clustered at its base. Service sheds or housing for the night shift, perhaps? Or were they the local dispatch points for little nasties like the one they'd already run into?

"We'll go on foot," he announced, stepping back to the group. "Major, get the rifles and four grenades out of the trunk. Dr. Hafner, go with him and bring back the Geiger counter that's under the front passenger seat."

Hafner's eyes widened a bit at mention of the extra weaponry, but he obeyed without argument. Meredith consulted his watch: they'd already used up over an hour of the four he'd allotted for this reconnaissance. The return trip should be faster, but that was still a lot of tower to explore in two hours. They'd have to make some guesses as to where the most interesting sections were likely to be.

Barner and Hafner returned with their loads. "Okay," Meredith said, slinging his Stoner 5.56 mm over his shoulder and hooking two of the rifle grenades onto his belt. "Stay in a loose formation and keep your eyes open."

The cluster of huts surrounding the tower base was not, as Meredith had assumed, physically connected to the structure, but were placed two or three meters away from its dull-metal wall.

"Interesting," Hafner said as they circled the tower in search of a door. "First structure we've come across in here that doesn't have that white ceramic coating."

"Would that make it a more recent building?" Perez suggested. "Put up near the end, when they didn't have time for cosmetic appearances.?"

"Or else it's subject to vibrations," Meredith said, recalling the fragile ceramic in the village building. "I think I see a door around that side. Let's take a look."

Like the doors they'd seen elsewhere, this one was tall, slender, and elaborately carved. It was also unlocked, leading into a bare lobbylike area shaped like a small piece of pie with a bite taken out of the tip. The missing point contained a floor-to-ceiling cylinder. "The elevator, I'd guess," Barner said as he took one final look outside and closed the door behind them. "Shall we see if it's running?"

"We can," Meredith said reluctantly, "but we'd better not actually ride it. Let's see if the Spinners understood the concept of stairs."

It took several minutes, but eventually they discovered that pressing a wall design caused the whole cylinder to ro-

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tate, bringing an off-center and doorless opening into view. Stepping into the opening and turning to the right led into the elevator car proper, while a left-hand turn ended in the stairway Meredith had hoped to find. With the colonel in the lead, they started up.

Progress was slow, hampered as they were by both the relatively cramped quarters and by Meredith's insistence on slowly easing his weight into each new step. Hafner muttered at least once that such exaggerated care was a waste of time with cable material structures, but Meredith ignored him. There was little conversation; faint hums and clicks were becoming audible from the areas around and above them, and no one seemed willing to drown them out with idle chatter.

Meredith took them to the very top of the stairway, hoping the most important equipment would be at that level. The inside release for the rotating cylinder, once located, worked perfectly. Holding his pistol ready, the colonel stepped through the short tunnel and into a garish sea of color.

For a moment he just stood there, his eyes and mind struggling furiously to adjust to the sight. *Give a small child a box of crayons and a detailed photo of a shuttle flight deck,* he thought, *and you might wind up with something like this.* The meter-wide semicircular ring that wrapped around the room beneath the windows was a familiar control board design; the panels set into it were decidedly not. Painted some of the brightest colors Meredith had ever seen, the panels had curved or even squiggled edges: some vaguely rectangular, but most not. For several seconds Meredith's brain tried anyway to classify them in terms of familiar polygons —squarish, trapezoidal, triangular— before finally giving up the exercise as pointless. The controls themselves— most black, but with occasional colored ones mixed in—were similarly arranged without regard for the concept of straight lines. None of the panels had exactly the same shape or layout, and some of the color juxtapositions were almost painful. *Make that a* color-blind *child,* he added.

The others were crowding out behind him now, muttering their own reactions to the optical assault. Of all of them, Hafner seemed the least affected, stepping over to the board with only a slight pause and peering down at it. "Well, at least the controls seem to be marked," he announced. "That's something."

Meredith joined him. Sure enough, there were small black marks to the left of each of the buttons and knobs, marks that looked like a cross between Chinese and Arabic. "Yeah, it really helps," he told Hafner dryly. He looked back at the wall that split this floor into two halves, eyes searching for a doorway that would get them through to the other side. Two full-length cylinders, smaller versions of the elevator-stairway shaft that they flanked, were the obvious candidates.

"Sure looks like the place," Nichols commented, looking around the room. "Must be . . . oh, a good five to ten thousand separate controls in here. What else could anyone need that much stuff for?"

"Who knows what else they might have down here?" Perez countered, leaning carefully on a bare part of the

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control board to gaze out one of the windows. "One certainly gets a good view from here. Perhaps all this does is handle power or lighting for the village."

"Maybe whatever's in the other room will give us a clue," Meredith said, taking one last look at the odd Spinner lettering. *In a science fiction movie,* he thought, *the hero would take all of ten seconds to figure out an alien control board like this. Wish to hell we'd brought one of those geniuses along.*

"Colonel," Barner said, his tone geting Meredith's instant attention. The major was peering out another of the windows. "We've got company."

Meredith followed the other's pointing finger and felt his jaw tighten. Approaching the tower from different directions were eight mechanical creatures like the one that had chased them out of the village.

"Gorgon's Heads!" Perez hissed. "Colonel, we'd better get out of here."

Automatically, Meredith estimated distances and speeds.It would be a close race. "Right. Everybody down the stairs —fast." He turned, took a step, and abruptly halted as his legs froze beneath him.

"Blood-sucking hell," Barner murmured.

The two small cylinders flanking the stairway had rotated to their open positions. Standing inside were a matched set of Gorgon's Heads.

Chapter 19

For a long moment the only sound in the room was the thudding of Meredith's own heart. The Gorgon's Heads stayed where they were, as if frozen by the same shock that had immobilized the humans. Only the gentle waving of their snakelike tentacles showed they were still active.

Now what the hell do we do? Meredith thought. The machines were barely five meters away—impossible to miss with either his pistol or rifle . . . but only if he had time to get one of the weapons lined up. An unarmed Gorgon's Head might be able to get to him before he could fire; an armed one could blow him off the map a lot faster. Run for it? Again, if they were unarmed one or two might make it back to the stairs. But *only* if they were unarmed . . . and there were still the reinforcements coming in at ground level to be dealt with.

"Shouldn't one of us be saying, 'Take me to your leader'?" Perez asked quietly.

"Shut up," Meredith snarled.

"No, Colonel, I'm serious," Perez said. "They haven't attacked us yet, or made any other movements that could be considered hostile. Maybe they recognize we're not Spinners and are waiting for us to open communications."

"Or maybe they're waiting for their friends downstairs to join us." Still . . . it might be worth trying. Bracing himself, Meredith took a step forward. One of the snakes on each Gorgon's Head seemed to track the movement, but otherwise there was no reaction. "I'm Colonel Lloyd Meredith, commanding the Earth colony on Astra," he said, keeping his volume level conversational. "We come in peace, seeking the creators of this cavern."

He paused, sweat trickling down his shirt collar. But again there was no re-

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sponse. "Any other suggestions?" he asked the others.

"Maybe you should try to get to the stairs," Barner offered. "I can't seem to get through with all this metal around, but you might be able to do so from outside."

"For all the good a rescue party fifteen kilometers away will do us," Nichols muttered.

"Let's dispense with the pessimism, shall we?" Meredith said tartly. But it *was* beginning to look like suicidal moves were about all they had left. "All right. Major, get ready to rip off that headset. The rest of you are to hit the dirt the second anything happens. Got it?" There was a murmur of quiet assents. "Okay. Here goes."

Carefully, Meredith slid his leading foot forward, his full attention on the silent machines flanking the exit. He brought the rear foot up, pausing before easing out the leading foot again. The door was a meter and a half away now. . . .

And without warning, the leftmost Gorgon's Head snapped one of its snakes out, the tentacle doubling in length to solidly grip Meredith's left wrist.

Afterward, Meredith would remember hearing the clatter of Barner's rifle being brought to bear and a general cacophony of startled yelps, but for that one horrifying second there was nothing in the universe but his wrist and the cold metal suction grip fastened there.

There was no question of making a break for the stairs; every instinct in Meredith's body screamed for him to get the tentacle off *fast*. Throwing himself backwards, he snapped his arm over his head—

And sprawled on his back at Perez's feet.

"What happened?" Barner snapped.

Meredith sat up, ignoring a momentary dizziness, and examined his arm. Completely whole, apparently functional, and without even a mark where the snake had gripped him. "It just . . . let go," he managed, not entirely believing it. "It—I guess it wasn't trying to hold me." He shifted his attention to the Gorgon's Head, which had withdrawn its tentacle again but had otherwise not reacted. Waiting? And for what?

"Could it have injected something into your wrist?" Hafner asked anxiously.

Meredith shook his head. *Waiting.* "No needle marks or inflammation—I already checked. And even with a hypospray you feel *something*." Cautiously, he got to his feet and again faced the Gorgon's Head. Natural fear versus natural curiousity . . . and for the moment the curiousity was stronger. "I'm going to try it again," he announced, amazed at the calm in his voice. Clenching his teeth, he started forward.

This time he stepped directly toward the Gorgon's Head, getting only a pace and a half before the same elongating tentacle snapped out. He managed to hold still as the metal again gripped his skin, his eyes on two other tentacles that arched over the machine like rattlesnakes preparing to strike. For five heartbeats nothing happened . . . and then the Gorgon's Head emitted a sound like a hiccup, and suddenly Meredith was surrounded by a cloud of smoke.

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He took an incautious breath and nearly choked. "It's all right," he gasped, to forestall any action from the others. "Just like being buried alive in spice teas." He sniffed again, but the cloud already seemed to have dissipated. Simultaneously, the Gorgon's Head withdrew its tentacle from his arm.

"Well?" Perez asked from behind him.

"Why are you asking *me?*" Meredith retorted. "I'm not in charge here."

"I wonder," Hafner said slowly. "Colonel . . . why don't you try going for the stairs again."

Meredith thought about it for a moment, then shrugged. "All right. Major, get ready with that headset."

Neither machine made the slightest move to interfere as he walked into the stairway entrance, nor did they react when Barner lobbed him the headset. "They seem to have lost interest in me," he commented as he put on the headset, temporarily out of reach of both Gorgon's Heads. "Let's hope the word's been spread to the rest of the gang."

"I'll be very surprised if it hasn't," Hafner said. "I think, Colonel, that you've been declared a friend."

Meredith paused. "You mean that puff of cinnamon smoke was my security clearance or something?"

"Either that or a confirmation signal that you were logged onto the computer. It may be that that tentacle was recording your scent or heartbeat or something."

"That's ridiculous," Meredith snorted. "I can't possibly smell anything like a Spinner."

"Maybe the data's been lost," Nichols suggested. "Maybe the Gorgon's Heads are trying to re-establish it, using you as a prototype."

"But—" Meredith closed his mouth. "Okay, let's put it to a real test, then. That other squad of Gorgon's Heads must be downstairs by now. If *they* don't give me any trouble, I'll concede you may be right."

He had to walk through the lobby and all the way around the base of the tower, but by the time he started up the stairs again he was convinced.

"I don't believe it," he puffed as he entered the control room. "Damn things acted like a bunch of pet poodles—took a sniff and then ignored me completely." He turned to Barner, motioned him forward. "Let's see if it'll accept you, too, Major."

It did; and in the end all five of them submitted to the Gorgon's Head's olfactory inspection. "I still don't understand it." Barner shook his head as the others cautiously tested their new immunity. "Why should their security system be the only thing that's fallen apart after all this time?"

"*And* fallen apart in just the right way to help us," Nichols added, gingerly touching one of the Gorgon's Heads' shells. "It could just as easily have decided to keep *every*one out of the tower."

"It may not be nearly as providential as you think," Perez said. "You could explain it just as well by a single minor failure plus a breakdown in communications. Suppose, for instance, that there's supposed to be a lock or independent security scanner elsewhere in the building, and that system's broken down. Now, these Gorgon's Heads find us here, but since the other system

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shouldn't have let us in if we weren't allowed, we must *be* allowed. You see? And since the Gorgon's Heads don't have us on their VIP list, they hurry to remedy that gap in their memory."

"Clever idea," Hafner grunted. "But pretty stupid of the things."

Perez shrugged. "Oh, I don't know. I've used the same technique myself. Once you're actually inside a restricted place it's not too hard to stay there."

"Well, whatever the reason," Hafner shrugged, "being in the Gorgon's Heads' good graces will come in handy when the anthropologists get here. I don't suppose they'd like working with snakes looking over their shoulders."

Meredith frowned. "What anthropologists are these?"

"Should I have said linguists? The people we're going to have to call in to translate all this." He waved over the control boards.

"Probably need computer experts, too," Nichols added. "Also mathematicians, materials specialists—"

"Hold it a second." Meredith cut him off. "Just where do you think we're going to find these people?"

Nichols blinked. "We got Dr. Chang and his group easily enough, didn't we? All we should have to do is send a list back with the next shuttle."

Meredith glanced at Perez, noted the sour look on his face. For obvious reasons, the colonel hadn't exactly advertised news of the Council's ultimatum and Chang's forced departure; it now appeared that no one else had given it much publicity, either. "As it happens, Doctor," he told Nichols, "Dr. Chang is no longer with us. He left because of a Council resolution barring non-Astrans from Spinneret facilities." He inclined his head toward Perez in a caricature of supplication. "Unless, of course, the Council would consider scrapping its edict."

Perez flushed, whether in anger or embarrassment Meredith couldn't tell. "The resolution was meant to protect Astra from having its only resource plundered by outsiders and being left then to rot or starve. That danger still exists."

"Aren't you being just a bit melodramatic?" Hafner grunted. "Not to mention living in the nineteenth century? We're not exactly native savages here, you know, who'll just sit around while the Spinneret is taken apart and shipped back to Earth."

"The secrets can still be stolen," Perez pointed out. "Besides, we don't need anyone else. The Ctencri have computer programs that can decipher an unknown language—they translated Earth's major languages in less than a week, I'm told."

"They also had some hundred thousand radio and TV channels as their database," Nichols pointed out. "All we've got are a bunch of control switches."

Perez still had a stonewall look on his face, but Meredith could tell he was weakening. "Well . . . if we kept the investigation team small—*and* international," he added, glancing at Meredith, "I suppose we could take adequate safeguards."

"Why international?" Barner asked suspiciously. "The U.S. has all the experts we could want."

"Let's not argue about that right now," Meredith interjected. He didn't

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want to fight with Perez in front of Hafner and Nichols; the threats he might have to make on this one would best be delivered without witnesses around. "We'll figure out whom to invite *after* we decide exactly what we need and *after* the Council decides whether or not to make trouble on the whole issue."

"In that case, maybe we ought to head back." Hafner shrugged. "I'm sure there's more to see around here, but we're not going to hit all of it in the time we've got left."

"Good point." Meredith stepped to the window and gazed out for a moment, scanning the cavern wall and fixing in his mind the direction of their marked exit tunnel. At least two more tunnel openings were visible, one of which ought to lead to the gravity equipment under the volcano cone. A complete mapping of this labyrinth would be an early priority, he decided, followed by a thorough examination of the tower and any other control areas they found. After that . . . repair the digging machine he'd found? Maybe. It would be instructive to see what part it was supposed to play in this ballet . . . and why its contribution hadn't been missed. "Yeah, you're right," he sighed, turning back. "There's too much here for one day. Come on; let's go home."

Chapter 20

The first napkin had been easy, but for some reason Carmen had to fold the second one four times before she finally got it right. Setting it down in the center of the plate, she stepped back to survey the result. *Terrible,* she decided, the perfectionist within her choosing that moment to surface and be offended. *Starburst napkin designs on Army-issue plates. Miss America at the shipyards. Oh, well. Peter probably won't even notice.*

That last, at least, was almost certainly true. Not that Hafner was uncultured; she would hardly enjoy having him around if he were. But the past weeks had been hectic ones for him, and the last four days had topped even that. It'd only been with great difficulty that she'd been able to draw him back to Unie long enough for this dinner.

Which brought up another issue entirely. She'd known Hafner for almost four months now, and while she appreciated him as a friend she had no feelings toward him that could remotely be considered romantic. So why had she missed his company so much while he was out poking around the Dead Sea? For that matter, why had she knocked herself out to make this evening something special? *Maybe I've simply forgotten what it's like to have a really good friend,* she thought—which was a rather depressing thought all by itself. *No doubt about it; I've got to settle down somewhere one of these days.*

There was a tap on the door, and she glanced at her watch with mild surprise. Hafner was seldom very late for appointments, but he usually wasn't this early, either. But no matter; things were adequately ready. Smiling, she opened the door.

"Hello, Carmen. May I come in?"

Her smile winked out. "Cris," she said, with a cold formality she hoped covered up her surprise. "As a matter of fact, I'm expecting someone else at the moment. So if you'll just—"

"Ah—Dr. Hafner, I presume." Perez

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nodded. "Don't worry, this will take only a minute." He moved forward . . . and somehow he was past her, strolling by the table settings with an appreciative nod.

Gritting her teeth, Carmen closed the door and stalked after him. "Contrary to popular opinion, I'm *not* on twenty-seven-hour duty here," she said icily. "So if you'd kindly restrict your calls to business hours—"

"Somewhere in the computer library is a copy of the *Scientific Directory*," he interrupted, turning to face her. "For reasons I won't go into it's been classified and hidden behind some security password. I'd like you to get me access to it."

Carmen took a deep breath. "In the first place, I'm not *about* to give you classified material without specific orders to the contrary. In the second place, you have an incredible gall to burst in on me without any better reason than *that*. I could have told you no over the phone."

He waited her out, and then lifted a finger. "In the first place, as you put it, there's absolutely nothing remotely classifiable in the *Directory*. Not only is it in half the libraries in North America and Europe, but I know for a fact it was accessible here a month ago. And in the second place—" He hesitated. "I don't want Meredith to know I talked to you."

She arched her eyebrows. "My, we *are* getting paranoid, aren't we? What makes you think the colonel would *want* to record your calls, let alone that he's actually doing so?"

He smiled tightly. "Come now, Carmen, you know better than that. I'm the thorn in Meredith's flesh, the major obstacle to his dream of making Astra America's fifty-second state. He's going to suggest to the Astran scientists that a number of American experts be invited to help us decipher the Spinneret controls, and the only reason he's hidden the *Directory* is to keep me from counterproposing a more international group."

She thought about that for a moment. Perez was probably the last person in the world she was interested in doing favors for—he'd proved time and again to be a master pain to everyone around him. And yet . . . it *did* make sénse to get the best people possible. The sooner they learned how to operate the Spinneret the better; and given the current situation in the Spinner cavern, there was precious little chance of any foreigner sneaking off on his own and stealing something. As for Meredith —well, if Perez had something devious in mind, the colonel had already proved he could take Perez' best attacks and use them to his own advantage.

And Peter was due at any minute.

"All right," she sighed. "Tomorrow morning I'll try to find your *Directory*. If I can get to it in ten minutes or less I'll copy it under 'Cris' on the general-access list. But I'm not going to waste any more time on it than that. Clear?"

"I'm very grateful," Perez smiled, inclining his head toward her as he headed for the door. "If you'll excuse me now, I must get back to Crosse; I'm on early-morning duty tomorrow. Goodnight, and thank you."

"Good-*night*."

Closing the door firmly behind him, she leaned against it for a moment, working the irritation out of her system.

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Then, glancing at her watch, she headed to the kitchen to check on dinner.

She'd half expected Hafner to arrive as Perez was leaving, a confrontation that would probably have left a distinct damper on the evening. It was therefore with an odd sense of relief—odd, at least, for her—that she had to wait nearly ten minutes for Hafner's knock finally to come.

"Hi, Carmen." He greeted her with a tired-looking smile as she let him in. "Sorry I'm late."

"No problem," she assured him. "The lasagna just needs a twenty-second final heating and it'll be ready."

"Lasagna, eh? Pretty extravagant meal for a poor civil servant—getting this private apartment must have really gone to your head. The mozzarella alone probably cost a fortune in favors." He sat down at the table and peered admiringly at the folded napkin.

"Actually, it didn't, though I *am* anticipating things a bit." She set the micro and went to drain the vegetables. "The Rooshrike are going to start regular goods shipments from Earth as of Thursday, and I've made sure every other food package is heavy on these so-called luxury items."

"That'll be nice—I know it'll raise *my* morale a lot. You going to distribute it through normal military channels or set up special stores?"

"I don't know." The micro *pinged* and she carefully carried the steaming dish to the table. "I'd like to start moving toward a normal economic system, but Colonel Meredith thinks things are still too unstable for that. Anyway, I'm not sure a luxury food store is the way to start. It smacks too much of the foreign-currency-only places in Moscow."

"Yeah." Almost reluctantly, she thought, he unfolded his napkin. "I wish I'd had a bottle of wine to bring, but I don't have friends in high places like you do."

"Except Gorgon's Heads."

He smiled wryly. "And with friends like those—" Shaking his head, he dug into his food.

"Rough day, I gather?" Carmen asked, pouring them each some water.

"More just dead-dull boring," he shrugged. "I'm not even *doing* anything aside from sitting there keeping the Gorgon's Heads quiet—it's everybody else who's photographing the control labels and computer-coding everything in sight. I never before realized how tiring it gets sitting around doing nothing."

"You *can* leave other people alone once they're in the tower, though, can't you?"

"Everywhere except the main control room. The top floor, I should say; we haven't actually proved it's the control room yet." He waved his fork. "But even in the other rooms no one can get to the stairs or elevators without one of us five escorting them. And heaven help anyone who tries leaving the tower itself. Davidson tried it once and nearly got strangled by one of those tentacles."

"Ouch. I don't suppose there's any way to persuade that guard circle to go patrol the village or something."

"I'm sure there is—just as I'm sure there's a way to induct more people into the Grand Order of Den Mothers, as Al Nichols calls it. We just haven't found it yet."

"Mm." Carmen shook her head.

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"I still don't understand exactly why you five were able to get special status but nobody else can. It seems—well, sort of capricious."

"Not really." Hafner finished off his lasagna and helped himself to another spatulafull. "Actually, if Perez's theory is right, the Gorgon's Head system is being quite self-consistent. The five of us had made it to the control room without being challenged by either one of their own units or by anything else, so as far as the Gorgon's Heads were concerned we must be supervisors and had to be recorded as such. But now that they've set up a cordon around the tower nobody else *can* get up there alone, and so no one else gets to be a supervisor."

"Leaving you five as rotating tour guides." The entire setup still seemed pretty bizarre, but if she worked hard at it she could believe it made sense. *The Spinners* were *aliens, after all,* she reminded herself.

"Actually, we're more like three to three and a half," he said. "Colonel Meredith hardly ever comes by, and Perez and Major Barner together don't pull much more than a single shift. It almost makes me wish I hadn't supported the whole Council idea way back when—at least then Perez wouldn't always be pulling 'official business' on us and ducking out."

"If there weren't any Council Perez wouldn't have been there in the first place," Carmen pointed out. "It would've just been the other four of you."

"Plus thirty soldiers, if I hadn't gotten all righteous about *that,*" he grumbled. "Someday maybe I'll learn to keep my mouth shut."

They ate in silence for a few minutes. The dining nook window faced west, and through it she could see that the lights of the admin complex were still ablaze. *Finishing up the details on our trade proposals?* she wondered. *Or still trying to figure out how to code the Spinner script? Probably both.* For a while she'd been resentful that no one had informed her when the Spinner tunnel was unearthed—by her reckoning she'd done more than her fair share for both the alien device and the people involved, and she'd deserved to share in some of the triumph, too. Now, though, she was just as glad she'd been somewhere else. She was already indispensable to too many projects.

"Penny for them."

She focused on Hafner again. "Sorry—just thinking about all the work we have to do to make Astra economically stable." She sighed. "And so much of it depends on how fast we can learn to control the Spinneret."

Hafner pursed his lips and looked out the window himself. "Carmen . . . what are the races out there planning to do with the cable they buy from us? You have any ideas?"

She frowned. "No, not really."

"It's not an idle question," he went on, almost as if he hadn't heard her. "The Spinners went to incredible lengths to build this place—some day soon I'll take you down to see their village, and I guarantee you'll be floored by it. But why did they do it? Suck an entire planet dry of its metals to make six-centimeter cables—what were they *using* the stuff for?"

"Any number of things." She shrugged. "We've worked up a three-

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page list of possibilities ourselves, and we don't know half of what there is to know about the cable yet."

He shook his head. "You're missing my point. The buildings down there—the whole Spinneret, for that matter—everything's lasted a hundred thousand years. Why on Earth would *any* culture make something that lasts that long?"

She started to speak, then paused. It *wasn't* a trivial question. "Maybe they were building the ultimate city back on their home world or something. Maybe a tomb or memorial, like the pyramids or the Taj Mahal."

"Or maybe a cage for something very big and long-lived," he said quietly. "That's one of the possibilities that keep occurring to me."

She grimaced. "That one I'd rather not think about. Maybe—well, maybe they just lived a lot longer than we do. In terms of lifetimes, then, the cable may not seem exceptionally durable."

"Maybe." Hafner leaned back in his chair. "That list you mentioned—any overtly military uses to it?"

"I—" She frowned. "Now that you mention it, no, there aren't."

"The colonel's playing it cool." Hafner nodded heavily. "But I doubt that it's doing any good. None of the races out there are dumb enough or naive enough to have missed the warfare possibilities."

She nodded silently. It was a topic she and Meredith had never discussed openly, but from the very beginning it had fluttered like a vulture over the trade negotiations. Using that superconducting solenoid to throw missiles; wrapping a warship in unbreakable cable; hurling a giant tangler thread among an enemy's ships to glue them randomly together—practically every peaceful use had its darker flip side. "I don't suppose there's any way we can dictate how our clients use their cables, though," she said aloud. "I think that's one reason Colonel Meredith wants all the aliens to have equal access to the cables, to minimize any strategic advantages it might provide."

"It could still foul up the political balance, though, maybe in more subtle ways," Hafner said. "Suppose one of the empires out there is having internal dissent, a problem maybe that the central government could quickly crush with a cable-wrapped spaceship. That would free the government's resources and attention to be turned to its neighbors."

"What would you have us do, then?" Carmen growled, knowing full well that he wasn't attacking her personally, but still feeling compelled to defend her project. "Turn Astra over to the UN? Or pull out entirely and let the Rooshrike have it? Either way, the cable's going to be made and used by *some*one. The genie's *out*, Peter; you can't stuff it back into its bottle."

He held up his hands, palms outward. "Peace. I wasn't picking on you or your work—and as far as genies go, I did my fair share to pop the cork. I just . . . that's the other possibility that keeps coming back to me. Maybe the Spinners used the cable material for warfare, too. If the crew here was recalled to help fight and never made it back . . . well, that would explain why the Spinneret was left running."

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She shuddered. "You *would* bring that up, wouldn't you?"

"Sorry." He shook his head. "Look, let's get off the whole subject, okay? I didn't bring any wine, but I *did* bring some music. Why don't you put it on while I clear the table, and then you can pick up the story of your life again. I think we'd made it through high school last time."

She forced a chuckle and accepted the cassette he handed her. "All right—but this time *you* start."

"If you insist," he said, stacking the plates. "But I warn you: I was a very dull person in college."

They both did their best, but it was clear the mood of the evening had been irreparably darkened, and Hafner left early.

Is this how it's going to be now? Carmen wondered as she undressed for bed an hour later, the book she'd tried reading abandoned for lack of concentration. *Is the Spinneret going to so dominate life here that we'll never be able to shut it out?*

Oh, don't be so dramatic, she chided herself. *You're tired, you're overworked, and you're feeling sorry for yourself. Ride it out girl; at the very least, nothing more can happen to you until morning.*

But she was wrong.

It was still the dead of night when the insistent buzz of her phone dragged her out of a surrealistic melding of all the war movies she'd ever seen. "Hello?" she answered groggily, knocking the instrument into bed with her before she could get her fingers to close on it.

"Carmen? This is Colonel Meredith. How fast can you pull yourself together and get out to Martello?"

"Uh . . . half an hour, I suppose," she said, still not fully awake. "What's, uh, going on?"

"One of the UN's ships has just arrived in orbit and is sending a shuttle down," he told her. "Aboard are our old friend Ashur Msuya . . . and President Allerton."

"*Allerton?*" she asked unbelievingly, the last remnants of fog evaporating in a rush.

"That's what I said—and as the old line goes, I've got a bad feeling about this. Whatever they're up to, I want you there, both as Council head and chief trade negotiator."

"Yes, sir. Are you bringing anyone else in?"

"Just you and me and possibly Major Brown. Why?"

"Well. . . . I don't know, Colonel, but it sounds to me like we're about to be delivered an ultimatum. Perhaps we ought to have a small delegation there, a delegation that would more completely represent the population.

There was a short pause. "The danger is that a group like that would display a complete *lack* of unity, which I presume is the exact opposite of your intent."

"True. But Msuya, at least, already knows about the Council and the fact that you listen to it. At least occasionally."

"That's why you're going to be there."

"Yes, sir . . . but I'm not in control of the Council. I can certainly back you up on anything you say, but if the Coun-

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cil as a whole doesn't agree we could have trouble later."

"In other words, you think I should invite Perez," Meredith said flatly.

Carmen swallowed. "Yes, sir. And maybe Dr. Hafner, too, as representative of the scientists."

The silence this time was longer. "I suppose you're right," he said at last, reluctantly. "In the short run we can afford squabbles in front of Msuya more than we can afford riots in front of the Rooshrike. In the long run . . . well, that'll have to take care of itself. All right, I'll give them a call. Be at the Martello conference room as soon as you can; the shuttle's due in under an hour, and I'd like time to confer with you first."

Carmen already had the phone strapped to her wrist and was pulling on her underwear. "Half an hour or less, sir."

"Good. By the way—any particular reason you suggested Perez and Hafner?"

"Yes, sir. Having seen the Spinner cavern, I thought they might have a clearer idea of what's at stake here. That might make a difference."

He grunted. "I hope you're right. See you soon."

Chapter 21

The conference room at Martello had been put together out of two offices and a small machine shop in anticipation of face-to-whatever meetings between Carmen and alien trade representatives. It was not yet even remotely plush, but the chairs were comfortable and the table had been polished to a high gloss. Standing stiffly behind his chair, Meredith glanced around the room once more, wishing they'd had more time to work on the place. A room adequate for meeting a Ctencri merchant seemed considerably less so for a talk with the Commander in Chief.

The far door opened and a young corporal stepped in, looking about as nervous as a soldier not actually under fire can look. "Colonel Meredith: may I present the President of the United States and Mr. Ashur Msuya of the United Nations." Flattening against the door, the corporal snapped a salute as Allerton and Msuya strode past him into the room.

Followed by four quiet men in dark suits, who spread inconspicuously along the back wall. *Secret Service?* Meredith wondered. *Or did Msuya decide to bring some muscle this time?* Hiding his worry, he threw Allerton a salute of his own. "Mr. President, Mr. Msuya: welcome to Astra. I'm sorry we haven't got a more elaborate ceremony for you, but we're a bit short of brass bands here."

Allerton smiled slightly at that; Msuya didn't. "That's quite all right," the President said. "We're actually here more on business, anyway."

So we're skipping even the pretense of a casual visit. Uh-oh. "I expected that was the case, sir," he said. He gestured to the three people flanking him. "Permit me then to introduce Dr. Peter Hafner, Civilian Council Head Carmen Olivero, and Councilor Cristobal Perez, whom I've asked to sit in on the meeting. If there are no objections, of course."

"There are," Msuya said. "Having civilians here serves no useful purpose. *You* are in command on Astra, Colonel,

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and I for one have no patience with this 'Civilian Council' smokescreen."

Deliberately, Meredith turned to Allerton. "Mr. President?"

"Mr. Msuya is correct in that all responsibility for Astran activities must rest with you," Allerton said. "However, if you want to consider these people as *advisors*, I think we can accept their presence."

Msuya growled something under his breath, and for an instant he and Allerton locked eyes. Then, with a fractional shrug, he pulled a chair out from the table and sat down. *So*, Meredith thought as Allerton and the Astrans followed suit, *Allerton hasn't completely knuckled under to UN pressure yet—or at least is willing to lock horns with Msuya on minor issues*. Tucking the information away for future reference, he looked at Allerton and waited for the other's move.

It wasn't long in coming. "Colonel, we've been hearing reports recently of what must be considered unusual policy decisions coming out of your office. Your refusal to allow Mr. Musya's scientific team to study your Spinneret cable and your abrupt dismissal of Dr. Chang's group at that same time, your inability to provide Earth with cable samples for study, and your apparent efforts toward unauthorized trade agreements have all raised questions about your fitness to command. I'd like to hear what explanations, if any, you have for your actions."

A well-rehearsed speech, Meredith thought, keeping his eyes on the President. "Am I being court-martialed, sir?" he asked bluntly.

"Not in the usual sense, no. Neither your rank nor your record are in any danger. Only—as I said—your position on Astra."

"I see." Meredith glanced once at Msuya's poker face, thinking furiously. "As far as the scientific teams are concerned, I believe my jurisdiction includes the final decision on personnel joining the colony, even if their stay is to be temporary. As the Rooshrike had retrieved the second Spinneret cable and I had already obtained assurances that they would share their test results with us, it seemed redundant and a little ridiculous to waste time with the few boxfuls of equipment we had available."

"The time was ours to waste if we chose," Msuya put in with a mildness that seemed to shelter the promise of later fireworks. "Furthermore, as a commissioned UN group we were legally outside your command authority."

"Excuse me, Mr. Msuya, but I had no independent confirmation of that fact," Meredith countered. "As I explained then, such orders or authorizations had to come through the holder of the mandate, namely the United States government." He glanced at Carmen, got a small confirming nod. "Now, as to providing Earth with cable, we're perfectly willing to do so once we figure out the best way to move it through hyperspace."

"Free of charge?" Msuya asked.

"At the very least, we'll need to be supplied with the equivalent mass in other metals—all of our customers will need to do that much. As for price . . . we haven't decided on such terms yet."

"I see nothing here requiring any decisions," Msuya said. "Astra is UN

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territory; we should not have to pay for what is already ours."

"Iowa is a state of the U.S.," Meredith shrugged, "but its farmers don't give their grain away free."

Msuya arched his eyebrows. "I believe I said Astra was UN territory, not part of the U.S. Unless there is some unilateral agreement here I'm unaware of?"

"No, of course not," Allerton said, throwing an annoyed look at Meredith. "Colonel Meredith was merely making an analogy."

And a damn stupid one, too, Meredith berated himself. Msuya had a stong enough case without having extra ammunition hand-delivered to him. At his left Hafner shifted in his chair, and on his far right Perez muttered something inaudible.

"I see," Msuya said, his tone making it clear the point was merely being postponed until later. "That of course leads directly into the whole question of trade agreements and your authority to make them. Do you deny you're offering UN property—namely Spinneret cable—for sale without proper permission?"

Meredith took a deep breath—and Carmen stepped unexpectedly into the brief pause. "It seems to me, Mr. Msuya, that we've kept very strictly to our legal duties, which I'll point out include both development *and* defense of the Astran colony. We're currently being orbited by ships of six alien races, more than half of them fully equipped warships. Do you have any idea what they could do if they thought we wanted to keep all of the Spinneret's technology and cable production for ourselves?"

"You fought off the M'zarch attack well enough."

"Through a combination of our luck and their ignorance," Meredith said. "Miss Olivero is correct: the only way to keep our neighbors peaceful is to make sure they see immediate benefits for doing so."

"So you're saying these offers of cable are basically fraudulent?" Msuya asked.

"Absolutely not," Meredith said. "Or would you have the human race stuck with a reputation as swindlers?"

"In other words, the UN had better rubberstamp your deals or else."

He was pushing hard to get Meredith into a corner; and Meredith was starting to get tired of it. "If you reject them you'd better be prepared to explain why we, as what the Rooshrike call an equal-status colony, are not permitted to make local trade arrangements. You'd better also be prepared to start any diplomatic overtures back at square one, in that event."

"All right, then." Msuya switched tracks smoothly. "As long as you've brought it up, what about this alleged trade agreement with the Rooshrike? Or were you unaware that the UN has an exclusive contract with the Ctencri?"

"If you'll recall, Mr. Msuya, you ended your last visit to Astra by threatening us with a total embargo of food and supplies," Meredith reminded him. "You made it abundantly clear that we would starve. As Miss Olivero pointed out, I had an obligation to protect Astra. Opening up an independent supply line seems to me to come under that heading."

He had the satisfaction of seeing the

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other frown with surprise; apparently that wasn't a defense he'd expected. "You can't protect your colony against its *owners*," he growled at last. "That's a completely ridiculous argument."

"Perhaps," Meredith shrugged. "But I have yet to see any proof that these threats and orders are the genuine will of the UN. It could just as easily be that the Ctencri are threatening Earth with an embargo of its own unless the UN obeys its orders in this matter."

Msuya stared at him for a moment, his jaw working with either rage or frustration. Then, leaning back in his chair, he gave Meredith a cold smile. "You dance exceedingly well, Colonel, especially for a military man. Let's see if you can dance out of *this*." He waved a negligent hand toward Allerton. "Mr. President?"

Allerton had the look of a bad toothache on his face. But his voice was firm enough. "Colonel Meredith, as Commander in Chief of the United States Armed Forces, I order you to comply fully with any and all instructions Mr. Msuya may give you concerning the Spinneret equipment or cable."

Meredith pursed his lips, trying hard to think. "Has the U.S. mandate been rescinded, then?" he asked in an effort to gain time.

"No, you're still in command of the colony itself. It's only the Spinneret that the UN will be handling directly."

"I see." *So we've knuckled under to threats of embargo,* he thought bitterly. "Suppose I refuse?"

Allerton didn't bat an eye. "Then you'd be relieved of duties and brought back to the States aboard the UN ship."

Meredith nodded slowly. "Which means you brought my potential successor along with you. May I ask who he is?"

"You'll be replaced by General Benigno Sandoval of the People's Republic of the Philippines," Msuya spoke up. "And, yes, he is aboard the main ship."

A puppet for Msuya to work, Meredith guessed, given the mess the ten-year-old regime had made of the Philippine economy. *Either way, the UN is going to have the Spinneret now. Unless. . . .*

At his left, Hafner stirred. "May I ask, Mr. Msuya, just what you'll do with the Spinneret if you're put in charge?"

Msuya's eyes hardened briefly at the *if*. "We'll be continuing your work, mainly: learning about the equipment and how to use it."

"With all this knowledge going exclusively to the UN, as opposed to all the world's governments?"

"Primarily. We couldn't risk the leak of sensitive material to the aliens."

"I see." Hafner paused. "And the cable, too, would be UN property, I suppose. How would it be distributed to countries who want to, say, build suspension bridges with it? Free, or would you charge for it?"

"I don't see that as any of your business," Msuya told him bluntly.

"Oh, but it is," Perez spoke up. "You see, whoever is giving the orders is going to need Dr. Hafner and myself to escort all of his workers into the Spinneret control room."

"Really." Msuya favored him with a patronizing smile. "Some local union regulation, I suppose?"

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"No," Perez countered tartly. "More a matter of continued breathing."

Mysuya snorted. "If you mean to threaten us—"

"Not at all. If you'll permit me, I'd like to explain about the things we call *Gorgon's Heads.*" In a few crisp sentences Perez described the Spinners' security machines and the apparent misunderstanding that had given five of the Astrans free passage among them. By the time he finished, Msuya's amused look had vanished completely. "So you see," Perez concluded, "we couldn't in good conscience help you unless we were convinced your plans were the best possible for the common people of Earth."

Msuya studied him, his eyes flicking briefly to Meredith and Hafner as well. Meredith held his peace, trying to figure out what exactly Perez was angling for. A UN commitment to the expanded immigration the Hispanic wanted? Or was it something more basic?—personal power in the new Astran regime, perhaps?

Msuya might have been reading his mind. "I think I can assure you, Mr. Perez—and you also, Dr. Hafner—that we'll take every step necessary to make sure the Spinneret is used to benefit all mankind. I'm sure your input will be considered extremely valuable; perhaps associate directorships of Spinneret operations for you and the other three would be the proper way to make your importance official."

"An interesting offer." Perez leaned forward to look past Carmen at Meredith. "I must apologize to Colonel Meredith, though—I don't believe he had finished his discussion with you and President Allerton. Colonel?—the floor is yours."

Meredith gazed at Perez's face for a heartbeat before turning back to Allerton. *What is he up to? He's got Msuya's offer—why turn the conversation back to me? Just to see if I'll go ahead and hang myself?*

"Actually, we were about finished," Allerton spoke up. He, too, was looking at Meredith . . . and his intense expression was nearly a duplicate of Perez's. "The colonel will be turning over Spinneret operations to Mr. Msuya immediately."

Meredith braced himself. *All right, you ghouls, here I go. Watch me twist in the wind.* "No, sir, I will not," he said. "I don't feel Mr. Msuya or any other UN official can handle the Spinneret under the current conditions as well as we of Astra can, and I can't in good conscience relinquish my command to him."

"Then you're relieved of all duty," Msuya said, the satisfaction in his voice unmistakable. "General Sandoval can be down in an hour; until then—"

"One moment, sir," Perez interrupted mildly. "I don't believe the Council's been consulted on whether General Sandoval would be an acceptable replacement for Colonel Meredith."

Msuya stared at him. "What are you talking about? Whom the UN appoints to oversee its territory is its own business."

Perez looked at Carmen. "Miss Olivero, I submit such an attitude toward a duly elected assembly indicates the UN's unfitness to properly manage the Spinneret."

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"I agree," she said, a slight tremolo in her voice betraying her tension. "Mr. President, Mr. Msuya—pending an official vote, the Astran Council tentatively rejects Colonel Meredith's replacement."

"What sort of nonsense is this?" Msuya snorted. "Meredith is leaving Astra, and that's final. If you don't like it you can send a protest to General Sandoval through one of his troops."

" 'Troops'?" Hafner asked. "So now you're bringing in occupation—"

Meredith silenced him with a gesture. "Miss Olivero is right," he said quietly. "I'm not leaving Astra."

The silence from the other end of the table was thick enough to drive tent stakes into. "You will leave," Msuya said at last, "or you will be guilty of treason, both to your own country and to the UN. Your own troops will turn on you rather than share in your crime."

"Possibly. But you may overestimate their loyalty to the UN. Most of us remember your lack of genuine interest in Astra before the cables began appearing."

"You have a paltry four hundred men," Msuya barked, his control snapping at last. "I can rent a cargo cruiser from the Ctencri and have four times that many here in ten days. Do you want to see your people ground like vermin into the dust?"

Meredith lifted his left arm, tapped the phone strapped to his wrist. "In less time than it takes for your sixteen hundred men to board their shuttles, I can be in contact with the chief Rooshrike representative out there. What do you think he'd do if I told him I was being invaded and asked for his help?"

"I'd simply explain you were no longer in charge—"

"He knows me. He doesn't know you."

"The Ctencri would support our demand."

"The Ctencri have no warships here . . . and the Rooshrike aren't disposed toward doing them favors."

Msuya spat something venomous sounding, the tightness of his jaw visible through his cheeks.

Allerton cleared his throat. "You realize, though, that Mr. Msuya is right about the legal consequences here," he said. "By disobeying my direct order you automatically draw a court-martial. All of you, in fact, will almost certainly be found in violation of various Federal laws, up to and possibly including treason."

Meredith focused on him. "All Astrans who'd rather not stay under the new conditions will be allowed to leave on the next ship," he said, wishing he knew what the other was thinking. Allerton's words were harsh enough and his tone only marginally less so; but his expression was relaxed almost to the point of contentment. *Is this what he really wants?* he wondered. *Open rebellion that'll draw the UN's fire away from the U.S.? In that case he's got a real treat in store.* "For the rest of us, I expect you'll have to try us *in absentia*. But I'm not sure American laws will apply to citizens of a foreign nation."

The words hung in the air for a good three seconds before anyone else caught on. "A *what?*" Hafner whispered as Carmen and Perez turned to look at him.

Allerton's expression never changed.

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"You're seceding from the union, then?" he asked.

"Not really, sir—Astra never was technically U.S. territory. We *are* declaring independence, however."

Msuya slammed both fists onto the table. "This has gone far enough. Guards!—all four of these people are under arrest."

The two men to the right of the door stepped forward, small guns magically appearing in their hands. "Allerton—your men, too," Msuya snapped.

The other two guards took tentative steps forward, stopped at Allerton's signal. "The Secret Service doesn't follow your orders," the President said coolly. "They have no authority to act in a case like this and therefore will not do so."

Msuya flashed him a look of pure hatred . . . and Meredith raised his phone and flipped its speaker to nondirectional mode. "Major, did you get all of that?" he asked.

"Yes, sir," Brown's voice came back, loud enough to be heard at the far end of the table. "The Rooshrike have been alerted. A landing party is standing by."

Msuya was the first one to speak. "You're bluffing."

Meredith shook his head. "They'll come if we ask them to," he said calmly. "The last thing you're equipped for is full-scale combat."

"I could kill you and your fellow scorpions first," he spat.

"You could," Meredith acknowledged. "But you'd be killing three of the five people who have access to the Spinneret control room. If something should happen to the others you'd be locked out forever."

For a long moment Msuya sat there, frozen. Then, slowly, he stood up and gestured to his guards, who put their weapons away. "As I said once before, Colonel," he said, his voice quiet as a graveyard, "you can throw me off Astra now . . . but you *will* live to regret it. The goods shipments you've contracted for with the Rooshrike will not leave Earth; the UN and the Ctencri will see to that. The embargo against you will be vacuum-tight, and will not be lifted until Astra starves to death or you're brought to New York in chains. Think about that when you're reduced to eating sand."

Turning, he strode to the door, yanked it open and disappeared into the night air, followed by his guards. Allerton stood up and nodded, his face carefully neutral. "I'm sure, Colonel, that you haven't heard the last of this," he said quietly. "But—unofficially, of course—I wish you luck." Without waiting for a reply, he turned and left.

"Well," Hafner breathed as the Secret Service men closed the door behind them. "He must still be in shock."

Perez pushed his chair back and let his own straight-backed posture dissolve into a tired slouch. "Not at all," he said with a sigh. "Allerton's delighted at the way things turned out. By declaring independence we've gotten him off the hook with the UN—he's not responsible for our actions, so Saleh can't legitimately stick the U.S. with a trade embargo or whatever."

"So we get hit by it instead," Carmen murmured.

"We were going to get embargoed anyway," Perez shrugged. "At least this way the U.S. doesn't suffer."

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Meredith cocked an eyebrow at him. "I was under the impression you didn't think much of the U.S.," he said.

"Not liking the government but caring about the people aren't incompatible attitudes," Perez replied.

"You just like the UN less?"

"I like the idea of UN control of Astra less," he corrected. "Like you, I believe all of us here can do a better job of administering the Spinneret than any big government. And with the Ctencri trade locked up, the UN is fast becoming a form of big government." Wearily, he got to his feet. "Colonel, if you don't need us anymore, I'd like to get back to bed."

"Of course," Meredith nodded. "You might as well all go. I'll need you alert by mid-morning when I announce our new independence. I've got a feeling it's not going to go over very well."

"Don't worry, Colonel," Hafner said, yawning prodigiously as he levered himself out of his chair. "We'll probably have a national anthem written by dinnertime."

Meredith sat quietly for a few moments after they were gone, his own eyelids feeling like stone tablets. *National anthem, indeed,* he thought. *You can tell right away how much experience he's had working with people.*

His phone buzzed: Major Brown. "The UN shuttle's ready to lift, Colonel," he reported. "Shall I let 'em go?"

"Sure." He paused, waiting. A moment later the roar of repulsers filled the room, oddly deadened by the soundproofing they'd packed into the walls. The sound faded slowly, finally reaching the point where normal conversation was possible. "Major? You still there?"

"Yes, sir," Brown growled. "Damn dizzy yahoo took it low and slow; probably trying to wake up as many people in Unie as he could."

"More likely trying to pick out the Spinneret entrance. Msuya's not going to give up that easily." He thought for a moment. "You still have a connection through to the Rooshrike?"

"Yes, sir."

"I want you to invite Beaeki nul Dies na down here for a meeting the day after tomorrow—well, tomorrow, actually, since it's already Thursday morning. Then contact all the other aliens with the same message. Set it for, oh, sixteen hundred hours."

"Friday at sixteen hundred; right," Brown said. "What do I give as the purpose of the meeting?"

"To discuss our marketing plans for the Spinneret cable . . . and to settle on a security arrangement for Astra."

Brown was silent for a moment. "You don't seriously think Saleh would send troops here, do you?"

"I don't know, but if I were he I'd take some kind of action pretty damn fast. You see, as a sovereign nation, we can make trade deals with other countries without going through the UN bureaucracy—and if that trade includes Rooshrike-supplied technology, we'll be bypassing the UN's monopoly. Saleh'll go from master of the universe back to chief referee at the world's biggest nursery school, and I can guarantee he's not going to go quietly."

"Mm. So you're meeting the aliens here to keep Msuya from eavesdropping?"

"More or less. Also to underline our new independence—I doubt that the al-

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iens much care where we talk, but it's a symbol of authority on Earth to have people come to you instead of vice versa."

"If you don't mind my saying so, Colonel, I think we have more important things to worry about than taking symbolic pot shots at Msuya's backside. How in the world are you going to sell this to the troops and civilians, good U.S. citizens all?"

"I don't know," Meredith said frankly. "I'm sure we would have come to this point eventually—we couldn't stay UN territory forever—so it's not like the idea will be totally unimaginable. It *is* going to be a mess, though. I just hope we can keep people from going off half-cocked one way or the other before they've thought about all the pros and cons."

"We'll have to keep an eye on the troops, especially," Brown pointed out. "Leading a 'loyalist coup' might be some ambitious lieutenant's idea of a shortcut to captain."

"A lieutenant or someone higher," Meredith grimaced. "Maybe you'd better try and sound out the other area commanders before the announcement. Barner, I think, will be okay, but Gregory and Dunlop could conceivably be trouble."

"Especially Dunlop, given all the friction you've had," Brown said. "While I'm at it, why don't I ask the Rooshrike to jam any attempts at broadcast communication from the UN ship?"

"Keep our propaganda unsullied by theirs?"

"Well-l-l . . . I know it sounds totalitarian, but I still think it would be a good idea. At least until you've had a chance to present our case."

"I don't really like it . . . but go ahead. Besides, Astra can't possibly qualify as a dictatorship as long as Perez is running around loose."

Brown chuckled. "He'd be almost funny if he wasn't so good at charming the brains out of people."

"Well, for once that talent's going to come in handy. Perez helped dig us into this position, and he's jolly well going to help us sell it."

"I hope he can do it. Frankly, I don't know myself whether or not we're making too much of a fuss over the Spinneret."

Meredith smiled wanly. *Right again, Carmen; it* does *make a difference.* "Remind me to take you down to the Spinner cavern some day, Major. You'll see we've got something worth fighting over—and I'd just as soon keep the battles confined to words."

"Yeah." Brown paused. "Colonel, did you read how the Rooshrike went about testing their Spinneret cable's strength?"

Meredith frowned. "No, I never got to that section of their report. Why?—is it important?"

"Oh, not really. They attached a couple of five-ton asteroids to the ends and started the whole thing spinning. They had it going nearly twelve turns a minute when the g forces tore the asteroids apart. It just occurred to me that if that's how they do their science, I don't think I'd care to see their approach to warfare."

And the Rooshrike are supposed to be technologically behind the other races, Meredith reminded himself. "Me,

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too," he told Brown. "Let's hope we can avoid a private demonstration. Get those messages off; I'll talk to you again after I've had some sleep."

"Yes, sir. Pleasant dreams."

Chapter 22

The roar of descending alien shuttles had long since faded away by the time Perez brought his motorboat to a stop by the Martello Base dock. "Cristobal Perez, Council member," he identified himself to the two soldiers guarding the boats. Like those at the Unie docks, they looked skeptical, but also like the others, they called in for instructions, and a minute later Perez was walking toward the conference room. *Only forty hours since Astra became its own master—at least on paper,* he thought, his head aching with too little sleep and too much conversation. *Feels more like a week.* Meredith had made his broadcast at ten o'clock that first morning; and while he hadn't done a bad job of describing Astra's new status, he'd left out the answers to several popular questions, and Perez had spent a great deal of the time since then giving those selfsame answers to various individuals and small groups. The worries generally revolved around the Astrans' status with the U.S. or the possible reprisals that could be taken against families and friends back on Earth. It was those conversations that lay behind most of his headache. The rest had come from the project that had kept him up most of the night.

The guards at the conference room door were a bit more stubborn, but in the end they too passed him through . . . and though Perez knew what to expect, the scene was still something of a shock. He'd seen photos of all five alien races, but there was nothing like seeing them up close and in person to drive home how alien they really were. The Ctencri, with his loose skin and batwing head crest, sat stiffly in his chair, his darting head movements vaguely reminiscent of a chicken pecking. The Whist beside him, by contrast, looked almost Buddha-like in its motionlessness . . . at least, insofar as a creature shaped like a fat mushroom with lobster claws and antennae *could* look Buddha-like. The M'zarch, resplendent in what looked like formal-wear body armor, was a hulking nightmare out of the Middle Ages, his physical presence matched only by the bear-sized Orsphis sitting across from him. Their rivalry, Perez had heard, was ancient and intense, and even without knowing either race's body language he could sense the tension between them. He shivered involuntarily, glad he wouldn't have to approach either one of *them*. The space-suited Rooshrike was seated next to a large, torpedo-shaped tank; focusing on the latter, Perez was startled to see a tentacled dolphin floating behind the dark glass. Meredith's announcement hadn't mentioned that a Pom would be coming to the meeting; apparently they'd decided their physical representation here was worth the cost of running a water-filled shuttle down and back up. *How in the world do they launch even a shuttle-sized ship?* he wondered abruptly. *Water is heavy.*

Meredith and Carmen, seated together at the head of the table, had apparently just finished their presentation, and the air was filled with quiet chirps,

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hisses, and grunts as the aliens conferred with each other. Sidling around the chairs, Perez exchanged polite nods with Meredith and leaned over Carmen's shoulder. "How's it going?" he whispered, glancing over the papers scattered on the table in front of her.

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"Fine, so far," she replied. "Everyone seems happy with our proposed cable price, and they're now apparently discussing whether or not Colonel Meredith's security plan is acceptable."

"And that is. . . ?"

"We'll allow two warships each by the Whissst and Orspham to stay in geosynch orbit, which will also be the normal parking orbit for unarmed trading ships. The Poms and Rooshrike can patrol farther out, and of course will keep an eye on the approaches through their respective territories."

"The M'zarch and Ctencri don't get in on this?"

"Not for now. The M'zarch are being punished for their earlier takeover try; the Ctencri apparently don't even like admitting they *have* warships, let alone showing them around."

"Um. So if the Orspham or Whist—"

"Whissst. Longer s-sound for plural."

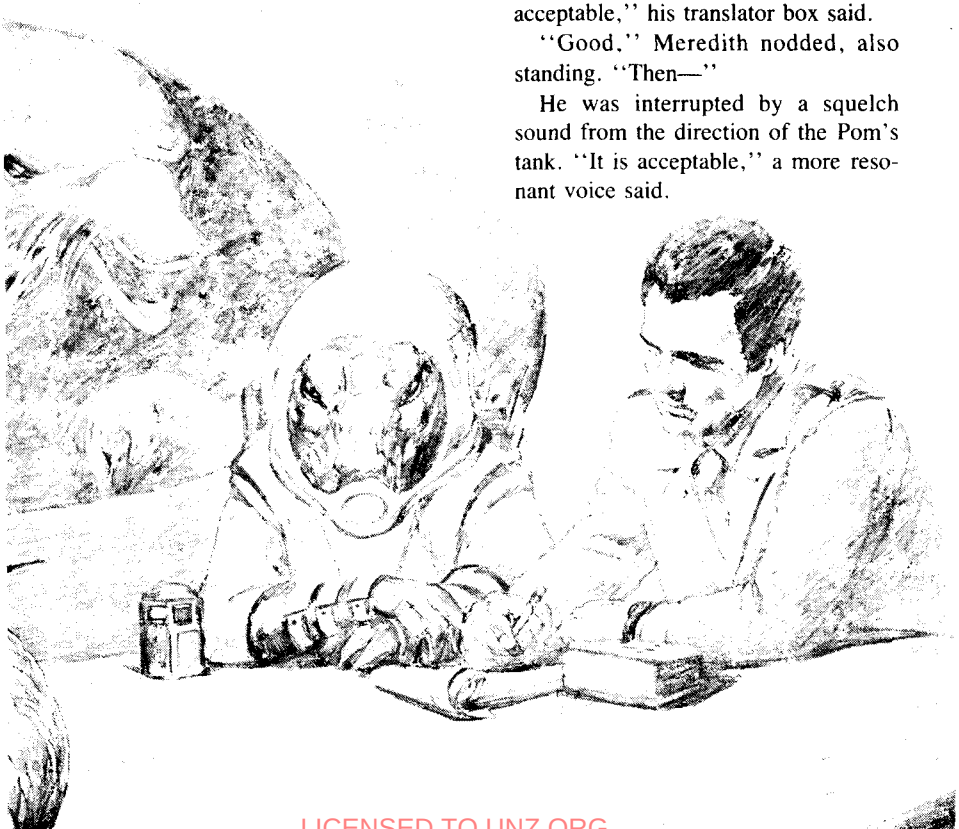
"Excuse me. If the Orspham or Whissst try to grab something and run they've got the whole Rooshrike space force to get through on the way out. And if anyone else gets cute, we get enough warning while they're fighting to do . . . something. Any idea what?"

"I think we're still working on that."

"Ah." Perez glanced down the table as the Rooshrike rose to his feet. "It is acceptable," his translator box said.

"Good," Meredith nodded, also standing. "Then—"

He was interrupted by a squelch sound from the direction of the Pom's tank. "It is acceptable," a more resonant voice said.



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This time Meredith just nodded and waited. One by one, the M'zarch, Orsphis, Whist, and Ctencri rose to voice agreement of their own. "Thank you for your time and cooperation," Meredith said when all but the Pom were standing. "As before, all trade questions or orders should be addressed to the human Carmen Olivero, using the channels already discussed." He paused, glancing at the silent aliens. "This meeting is now over."

He turned toward Perez; and as if that was the signal they'd been waiting for the aliens finally moved, stepping away from the table and moving generally toward the door that exited onto the landing field. "Well, at least that's settled," Perez commented, hoping to deflect Meredith from awkward questions about what he was doing here. The Ctencri, he noted, had paused to touch fingers to the Orsphis's pine cone-shaped tusks and to speak for a moment with the Whist. "And we gained another drop of social information in the bargain: the aliens' pecking order."

"You mean the order in which they accepted the agreement?" Carmen asked, collecting her papers together. "Hardly. My guess is that that was simply in order of increasing distance between Astra and their capitals."

"Oh." Across the room, the Ctencri was following the M'zarch outside. "Well, I suppose I'd better get back to the mainland. See you both later."

He caught up with the Ctencri a few meters past the door. "I'd like to speak to you for a moment, sir, if I may," he said, falling into step beside the alien.

The Ctencri stopped abruptly, twittering. "Certainly," the disk around his neck said.

Perez swallowed. Standing there together, in full view of a dozen soldiers, he felt painfully conspicuous. "I would like to ask a favor of you and your people," he told the alien. "I have some messages I would like to have quietly delivered to various people on Earth —that is, delivered without the knowledge of the UN authorities."

"You wish for us to perform messenger service for you?"

"I doubt it'll be all that much work," Perez said dryly. "By now you must have built up a network of human informants in various parts of the world. My envelopes are sorted by nation; you need merely to distribute them to your agents, who can stamp and mail them."

The Ctencri seemed to be considering that. "And what payment do you offer for this service?" he asked.

"I'm sure we'll be able to work that out later," Perez told him. "A certain quantity of Spinneret cable, most likely."

"A valuable payment for so small a task."

So the Ctencri were good enough businessmen to be suspicious of something-for-nothing deals. "Not really . . . because there's a bit more to this. A number of these people— perhaps all of them—will be wanting to come here to Astra, something the Earth governments would probably try to stop if they knew about it. I'm counting on you to provide quiet transport for them."

The alien's facial features shifted, his crest simultaneously stiffening. Perez felt his leg muscles tighten in automatic response, wondering if he'd said something wrong. "You ask a great deal,"

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the Ctencri said at last. "Have you the authority to guarantee payment?"

Perez began breathing again. "Yes, I believe I do. I am a member of the Astran Council, and am influential in other ways as well. If you carry out your end properly, you will be adequately paid."

"Give me the messages."

Reaching under his coat, Perez dug out the fat envelope and handed it over. "You should be prepared to hear from these people within a few days after you mail the letters. I presume there are channels they can go through to get to you?"

"There are; and we will record their names for reference before the messages are delivered."

"Good. I'll expect to see the first of them here within a couple of weeks. And remember: this *must* be kept secret from the authorities."

"I remember. Is that all?"

"Uh . . . yes."

"Good-bye." Without any parting gesture Perez could detect, the Ctencri turned and continued on his way. Perez watched him a moment, then started back toward the docks. *Well, that's that,* he thought, feeling strangely nervous about the whole transaction. *In a few weeks I'll either present Meredith with a* fait accompli, *or be up to my neck in trouble. Or both.*

"A package?" Meredith asked quietly, holding his phone close to his mouth. "What sort of package?"

"About twenty centimeters by ten by maybe five," the soldier said. "Looked soft, like paper or wrapped disks instead of some kind of hardware. They talked for a couple of minutes, but we weren't able to get an eavesdropper lined up on them in time. Do you want Perez picked up, or the Ctencri shuttle barred from launching?"

Meredith pursed his lips, glancing past the phone. Beaeki nui Dies na and the Pom representative had, by prearrangement, stayed behind the general exodus for a short talk, and he didn't really want to keep them waiting. Especially not to haul the Ctencri in for some sort of questioning. Besides, at the moment neither Perez nor anyone else on Astra had any information that could possibly be considered classifiable. Once they figured out some of the Spinneret's controls . . . but that was still months or longer in the future. "No," he told the soldier. "Let them both go. I'll have someone check on Perez's recent movements and computer usage later. You're sure nothing passed the other way?"

"Positive, sir. Perez's hand wasn't in position even to palm something small."

"All right. Let me know if Perez goes anywhere but the docks; otherwise just go back to normal duty. And that was a nice bit of observation, Sergeant; expect to find a commendation logged on your record for it."

"Thank you, Colonel," the other said, pleasure clearly evident in his voice. "Just doing my job, sir."

"Carry on, then. Out."

He clicked off the phone, his irritation at Perez somewhat mollified. *For everyone like Perez, there's at least one more like Sergeant Wynsma,* he decided . . . and for the moment, at least, As-

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tra's military force seemed pretty solidly on his side.

Of course, if things started getting tight, some of that loyalty could wear a *little thin*.

Carmen, sitting by the two aliens, must have been keeping at least half an eye on him, and as he lowered his arm she nodded. "All set, sir," she said. "Beaeki nul Dies na can get the tanks to us by the day after tomorrow—their mining base on the inner planet has a complete set of spares. And Waywisher says they can have a full-sized ship for our use within a month."

"Excellent." Meredith looked at Beaeki. "You've considered the fact that our plants will be very different chemically from yours?"

"We have dealt extensively with carbon-based life," the Rooshrike said. "The tanks will be perfectly compatible with your flora, especially as the lower temperatures here will make the tank materials even more inert."

Meredith nodded and turned his attention to the glass-enclosed Pom. "Waywisher, we're under no illusions as to how much rental of your ship will cost. Are you aware we can offer payment only in Spinneret cable?"

"We have need for vast amounts of your cable," the Pom's deep-voiced translator said. "We are happy to assist you in this matter as a way to defray the costs we will soon be incurring."

"I see," Meredith said, feeling a brief flicker of uneasiness. Aside from their spacecraft, the Poms supposedly built little if anything requiring great structural strength. Were they embarking on some large-scale project, such as an orbiting habitat? Or were they planning something else—a fleet of indestructible ships, perhaps?

He put it out of his mind. The Rooshrike had thus far proven themselves to be accurate sources of information, and they'd never given any hint that the Poms were anything but peaceful. "Well, then," he said to both aliens, "we'll be ready with our end of the project by the time you deliver on yours. I believe, Beaeki nul Dies na, that your first load of metal will be delivered about the same time as the tanks?"

"Yes," the Rooshrike said. "One hundred ten metric tons, for a cable fifty kilometers in length. I trust you can make one that long?"

"I'm sure we can," Meredith said, trying to sound confident. *Well, Spinneret Incorporated is now in business,* he thought. *I hope to hell none of the equipment decides to go on strike.*

Chapter 23

The Rooshrike hydroponics tanks actually wound up arriving a day late, but as Astra's microbiologists took that long to get their cultures of gene-tailored algae going anyway Carmen wasn't inclined to press the point. The Rooshrike ship captain, apparently used to stricter insistence on contractual fine print, seemed greatly relieved at Carmen's leniency. She accepted his thanks gracefully, but made a mental note to learn more about normal interstellar business practices as soon as possible. She didn't mind getting a reputation for fairness, but she didn't want anyone thinking they could get away with murder, either.

The metal delivery was another matter entirely, and clearly under the command of someone who knew what he

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was doing. The heavy-duty shuttles dropped out of the sky with clockwork precision, each gliding down on its swing-wings to the new landing region north of Mt. Olympus, discharging its cargo of scrap metal, and lifting on repulsers in time for the next shuttle to take its place. The pile of boxes grew; and as it did so Carmen worried alternately about what would happen if the leecher kicked in prematurely, and what they'd do if it didn't kick in at all.

Fortunately, the need to explain either never arose. The last shuttle was climbing into the sky, and workers were beginning to spread the piles of boxes for better ground contact, when the leecher worked its quiet magic. Carmen was standing next to the Rooshrike project manager as the metal began sinking into the ground; and though his startled comment came out untouched by the translator, she found herself nodding in full agreement.

There were some things that were universal.

In the Spinneret control tower the mood was considerably less philosophical, hovering as it did between excitement and frustration. "It's starting," Major Barner reported, holding his headphone tight against his ear. "Leecher's gone on."

Hafner nodded, his eyes sweeping the garish control board and trying to follow the changes in the pattern of lights. It was an unnecessary exercise, of course; the cameras that had been painstakingly set up were recording every square millimeter of the tower's controls, as well as synching their data with a hundred other monitors both above and below ground. But Hafner felt useless enough here as it was, and studying the indicator lights was better than doing nothing.

The short-range radio crackled in his ear. "Got something on level ten," one of the other observers reported. "Whole bank suddenly lit up. Anything happening to correlate?"

"Hang on, I'll check." Hafner relayed the message to Barner, then stood chafing as the other checked his own comm net. The most painful part of this, Hafner knew, was that he had originally agreed with Meredith's insistence that only a single long-range radio be allowed at each observation point. From a security standpoint it still made sense; but Hafner hadn't counted on the frustration such an awkward setup would generate. *First a den mother, now an organic telephone relay,* he groused, staring at the vigilant Gorgon's Heads flanking the doorway. *Why should we really* care *if someone gets a peek at the controls, anyway? How would they get in to* do *anything—bribe one of the Gorgon's Heads?*

"The long coil's starting up," Barner announced.

Hafner's mind snapped out of its reverie. "You mean that solenoid that knocks flyers out of the sky?"

"That's the one." Barner listened a moment longer. "Hope it's all right—it's got a hum they can hear right through the wall, and the pitch has changed twice already."

Hafner frowned, raised his radio. "Simmons? Have those lights changed at all?"

"Yeah: two of 'em have gone out. And listen—I just figured out what the light pattern reminds me of. It's almost

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like a periodic table with the top right-hand section chopped out—''

''All the non-metals?'' Hafner interjected.

''Yeah. But there're also three more rows of lights underneath where the actinide series usually goes.''

Barner had moved close enough to hear both sides of the conversation. ''I thought there were only a hundred and seven elements.''

''Maybe the Spinners found some new ones,'' Hafner suggested. ''The cable's made out of *something* we don't know about.''

''So what is the coil doing, sorting out the metal that's coming in by element?''

''That'd be my guess,'' Hafner said, a little surprised at Barner's quckness. ''They could be running the solenoid like a giant linear accelerator, where the frequency of the driving electric fields will depend on both the mass and charge of the ions being accelerated. Either it's keyed to go through each element in sequence, or else the stuff that's coming in determines what goes through first.''

''Mm. You know this whole place is using up one hell of a lot of power. You had any indication yet where it's coming from?''

''Probably put their generator at the end of a tunnel somewhere. That's sure where *I*—'' He broke off as Barner's face abruptly changed. ''What's wrong?''

''Doctor,'' the major said slowly, ''that coil down there. If it can knock out a flyer's repulsers a thousand meters up . . . what's it doing to the men in the tunnel with it?''

''Why—'' Hafner felt his mouth go dry. The medical people *had* okayed all of the observer positions . . . hadn't they? ''But weren't you just talking to them?''

''No—it was the men in the outside hall.'' Barner was tapping the call signal. ''Edmonds, are you in contact with the men inside? . . . No, I mean since the humming started? . . . Damn. Get that door open and—''

''Wait a second,'' Hafner interrupted. ''Ask them to test first for electric field strength in the hallway where they are. If there's no reading, the wall may be acting as a shield, and they'd better not breech it.''

''It doesn't matter,'' Barner said quietly. ''The door won't open anyway. It seems to have locked itself.''

Hafner stared at him, then let out a quiet sigh and turned away.

The solenoid ran for another two hours before finally shutting both itself and the door safety interlocks off. The two men who'd been inside were found in contorted positions against the door, dead.

And at sundown, in full mechanical indifference, the Spinneret sent its cable out toward the equally uncaring stars.

Two more men, Meredith thought wearily, his eyes fogging slightly as he read the report. *Two more men.*

Sighing, he leaned back in his chair and stared out the open window into the darkness outside. It was late, and he knew he'd pay for that the next day, but his mind was far too keyed up to sleep. The whole event had come off virtually without a hitch: they'd successfully produced a cable to order, had taken disks and disks worth of data on the Spinneret's operation, had obtained their

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first clues as to what boards in the tower controlled which activity.

And the deaths of two men had turned it all to ashes.

There was a tap at his open door, and Meredith looked up to see Carmen standing there. "Up late, aren't you?" he asked, waving her to a chair and flipping his terminal to standby.

"I saw your light and thought I'd drop in on my way home," she said, sitting down and handing him a disk. "You might be interested to know we now have an official balance with the Rooshrike of just over one point eight billion dollars."

"Which makes us either a fair-sized corporation or a small country," he grunted, plugging in the disk and scanning the financial data recorded there. "That's, what, two billion minus the hydroponics tanks?"

She nodded. "And we've got several hundred million in other stuff on order, so this won't last very long. But for the moment, at least, we're rich."

"Um." Ejecting the disk, he handed it back. "I trust the Rooshrike are happy with their new plaything?"

"Delighted. Last I knew they'd caught one end of it and were starting a long, leisurely turn toward the proper shift direction."

"I hope the cable shifts with them."

"It should. Sileacs tal Mors kith indicated they've done some tests with normal cables trailing behind starships. Besides, the Spinners obviously got the stuff out of the system." She paused, her eyes searching his face. "I understand we lost a couple of people today."

Meredith nodded grimly. "Burned out brains or something—none of our doctors are really sure of the exact mechanism."

"I didn't realize electric fields could kill."

"Neither did I. Neither, apparently, did anyone else." He sighed. "Looks like Perez is going to turn out right again. We're simply not going to be able to handle everything here by ourselves. The colony population was designed for geological studies and farming—period. Dr. Hafner and the others have made some damn good guesses all the way down the line, but none of us really knows what we're doing down there. It's a wonder more people haven't gotten themselves killed."

"So what's the answer?" Carmen asked after a moment. "Import experts from Earth?"

"It's that or let the aliens in on it. The real question is whether Saleh will be hard-nosed about it and lump people in with everything else he's embargoing."

"You're going to be making a list of people you'd like to invite?"

He raised an eyebrow. "You've been talking to Perez, have you? Ah—" he added as the light dawned—"it was *you* who pulled the *Scientific Directory* out of cold storage for him to give to the Ctencri, wasn't it?"

She blushed violently, but almost instantly the color vanished into a look of surprise. "He did *what?* But—he said he only wanted to make up his own list for the scientists to vote on."

"Apparently he decided to skip the procedural details," Meredith said dryly. "He must have given the Ctencri a stack of invitations to deliver. I wonder how

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he expects them to get the UN to provide transport."

Carmen still looked confused. "But how did you know—I mean—"

"We checked his computer usage after he gave a packet to the Ctencri at the security meeting. He hadn't gotten around yet to clearing the file you dumped the *Scientific Directory* into." He smiled briefly as she suddenly looked stricken again. "Don't worry; I'm not mad at you for doing it—he would have gotten it one way or another. There's probably no real harm done, though I'm going to wring his tail for bypassing me like that."

"Only if I don't get to him first," Carmen growled. "That smooth-talking—"

"Save your anger," Meredith advised. "Consider him as now owing you a big favor, and make sure he knows it. It may help keep him in line."

"I doubt it." Carmen shook her head. "I just can't figure him out, Colonel. One minute he's on our side, and the next minute he's pulling something underhanded like this."

Meredith shrugged. "He's *never* been on our side; we've just occasionally been on *his*. He has a vision for Astra and has been pushing us toward it ever since he got here."

Carmen's lip curled. "Yes—his paradise for the poor of Earth. Probably want to put a duplicate of the Statue of Liberty in orbit somewhere."

"Actually, as matters stand now, his huddling masses are probably the only new colonists we're likely to get. Permission to leave Earth lies with individual nations and, ultimately, the UN, and Saleh's not likely to let us lure away the brightest and best."

"Which means," Carmen said slowly, "that unless the Ctencri are personally bringing Cris's scientists here, they're probably not coming."

"Probably." Meredith glanced at his watch. "Well, I'd better let you get home. You're bound to be busy taking orders tomorrow after the way today's operation went."

"Yes." Carmen sighed and got to her feet. "Are we going to have a proper funeral, or are you going to keep the deaths secret from the aliens by giving them a private burial somewhere?"

"We'll have a funeral. We don't have to advertise how they died." Hitching his chair closer to the desk, he reactivated his terminal. Taking the cue, Carmen left.

For a moment Meredith stared through the terminal, wondering for the millionth time why this burden had fallen to him. *I never asked for this,* he reminded the universe resentfully. *I wanted to make Astra a modest success, collect my brigadier's star, and go home. Why the hell couldn't the Spinners have turned off their damned voodoo machine when they left?*

The terminal had no answer for him. Shaking his head, Meredith cleared his mind of questions and got back to work. At least, he told himself, he'd soon have some experts here to help share the load—presuming, of course, that the Ctencri came through on their end of Perez's deal.

Loretta Williams was just putting the vegetables on the stove when the doorbell rang. "Kirk, can you get that?" she

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called, grabbing the potholders. "I've got to get the roast out."

"Sure, Mom," the teen's laconic voice came from their tiny living room.

Preoccupied with the roast, Loretta didn't hear the door open; but the next thing she knew, Kirk was standing in the kitchen doorway. "Couple of guys to see you," he announced. "They say they're from the government."

Her first thought was that it had something to do with her latest grant request, but even as it occurred to her that National Science Foundation officials worked a strict nine-to-four day, she turned and got her first look at the men behind her son . . . and all thoughts of science evaporated. Attired in common business suits, they could have been bureaucrats from anywhere in Washington . . . until you saw their faces. . . .

"Dr. Williams?" the taller of the two asked.

"Yes," Loretta acknowledged, stepping forward and handing Kirk the potholders. *IRS?* she wondered. *Or even FBI?* The second man looked vaguely Iranian; could this be about that pottery fragment she'd brought back from the Dasht-i-Kavir?

The tall man already had his wallet open. "I'm Stryker; CIA. This is Mr. Taraki from the UN. We'd like to talk to you for a few minutes."

"All right," Loretta said through dry lips. The *CIA?* "Kirk, please finish getting dinner ready; you and Lissa can start eating without me."

Closing the kitchen door behind her, she led the men to the farthest corner of the living room. It wasn't until they were all seated that she noticed they'd subtly maneuvered her into the corner chair, putting themselves between her and any exit. Consciously relaxing her jaw, she waited for the axe to fall.

"Dr. Williams, I have a letter here for you," Taraki said, his English good but with a strong accent—Farsi or one of its dialects, she tentatively identified it. Pulling an envelope from his pocket, he handed it to her.

The seal was already broken, she noticed as she withdrew the paper. The letter was short, but its message left her with the feeling of having been out in the desert sun too long. She read it twice, hoping that would help. It didn't.

Finally, she looked up. "I really don't know what to say," she murmured. When neither man spoke, she went on, "I mean, I recognize that Astra is a trouble spot right now, but it's still flattering to be invited to go work on translating the Spinner language."

"Would you like to go?" Stryker asked.

She hesitated, wishing she'd kept more up to date on the flap going on out there. "I'd *like* to, yes. But I thought the UN had banned travel to Astra for the time being."

"It has," Takraki said. "Your letter was brought to Earth aboard a Ctencri ship. You were supposed to sneak out the same way."

So that's what the business about contacting the Ctencri was all about, she thought, her eyes flicking to that part of the letter. "Oh. That sounds . . . rather illegal."

"It depends," Stryker shrugged. "How good an American do you consider yourself to be?"

"Why, I—pretty good, I suppose,"

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she managed, taken somewhat aback by the question.

"And what do you think of the UN?" the CIA man continued.

Loretta shot a glance at Taraki's impassive face. "The tirades against America annoy me sometimes, but they've done a lot of good in the poorer nations. I guess that, on the whole, I support them."

The two men exchanged looks, and Loretta caught Taraki's shrug and fractional nod. "In that case," Stryker said, turning back to Loretta, "we'd like you to accept the invitation . . . on one condition." He paused. "That you agree to turn over all your findings directly to the UN."

She looked at them for a half dozen heartbeats, shifting her eyes back and forth between their faces. "You want me to be a spy," she said at last, trying hard to keep the distaste out of her voice.

Taraki apparently heard it anyway. "You seem to think that working against traitors to humanity is somehow wrong," he said. "The colonists are attempting to keep the Spinneret for themselves, in violation of orders from both Secretary-General Saleh and your own President Allerton. If a group of terrorists were planning to mine the Strait of Hormuz or reconstruct the smallpox virus would your conscience also act irrationally?"

"I—well, no, probably not. But the Astran colonists aren't terrorists—they're just normal American citizens, most of them—"

"Not anymore," Stryker interrupted quietly. "They've declared total independence from Earth."

She sat for a moment in silence, trying to digest that. Surely something *that* newsworthy would have penetrated even her normal inattention to such things. Which meant the government was keeping the news a secret. Which meant . . . what? "I'm very sorry, Mr. Stryker; Mr. Taraki," she said. "But I really don't think I could do what you're asking."

Stryker pursed his lips. "Actually, Dr. Williams, I'm afraid you really don't have a choice. You're the only linguist on the Astran list who possesses both the skill and the—ah, other qualities—that we're looking for. If you won't go voluntarily, the President has prepared a special executive order drafting you into the armed forces."

Loretta licked her lips. Two thoughts—*that's a pretty totalitarian thing to do* and *things on Astra must really have them worried*—chased each other around her mind. But it was all simply mental gymnastics. Confronted with an order like that, she knew she'd give in. It was far too late in her life to learn how to buck that kind of authority. "I'll need a few days to make arrangements with the university," she said. "Also, to have someone look after my children—"

"All taken care of," Stryker said as he and Taraki stood up. "A car will pick you and your children up at nine tomorrow morning."

"Wait a minute," she put in as they turned toward the door. "Why do Kirk and Lissa have to come, too?"

"We'll be announcing Astra's rebellion sometime in the next week," Stryker told her. "At some point your supposed collaboration may leak out,

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and of course we won't be able to explain your true role anytime soon. There could conceivably be violence, and we'd rather your kids be where we can protect them."

"Oh." Loretta's throat felt tight. That was an aspect to this that hadn't occurred to her. "But . . . what about school and—"

"It'll all be taken care of, Doctor; trust us," the CIA man told her soothingly. "They'll be fine—and when you come home they'll get to share in the honor you'll have earned. Now, don't worry about anything, and be ready to leave at nine tomorrow. And thank you."

She saw them out, then walked slowly back to the kitchen. Kirk and Lissa were nearly finished, their usual bickering subdued by the knowledge that something unusual was going on. She broke the news as best she could, which they fortunately took without argument or complaint. *It's something that has to be done,* Loretta thought as she dished out her own food, *and it's now up to me to do it. Who knows?—maybe I'll find out being a spy queen is a lot of fun.*

But despite the pep talk, the expensive roast still tasted like so much warm cardboard . . . and she was long falling asleep that night.

Chapter 24

Carmen had done a fair amount of scuba diving back on Earth, and during the long trip to Astra she'd had several chances to experience weightlessness. The combination of the two, though, was something that took getting used to.

Floating in the center of the Pom ship, flapping her hands slowly against the gentle sternward currents, she focused her attention away from her rebellious stomach and onto the circle of huge windows set into the hull around her. Through one of them Astra's sun was visible, its light filling the chamber and turning the water into a brilliant green fog. "Impressive," she said carefully, keeping her facial movements to a minimum. The full-face mask wasn't supposed to leak unless mishandled, but she had only Lieutenant Andrews's word for that, and she had no wish to have any of this gunk inside with her.

"Thank you," said a deep voice in her ear. The Pom had been drifting toward the windows; with a powerful flip of his tail he rolled over and returned to Carmen's side. She caught just a glimpse of a small black cube in his tentacle as it was slipped back into a pocket on the alien's harness. "Light intensities seem to be within a few percent of optimal," the translator voice continued. "It's still too early to get a good growth curve for the algae, but that should only take another few hours."

"Good." A second Pom swooped in out of the murk, his wake catching Carmen and starting her spinning. She flailed a bit, managed to stop herself. *Like being in the porpoise tank at the aquarium,* the thought struck her. *At feeding time,* she added as a third Pom brushed casually between her legs to join the party. For a moment the three aliens drifted together like spokes of a wheel, their noses almost touching as they conferred. Then they broke formation and her earphone came alive again.

"The flow speed is now properly adusted," the Pom leader informed her.

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"The algae will have the proper light and dark periods for maximum growth."

"Good. Will your extractors be able to handle the output?"

"Certainly. The usual crop for this design of ship grows nearly twice as quickly as yours will."

"Interesting. We might like to purchase a sample for study. If it proves compatible with our chemistry we might try switching products."

"You would do better, in all honesty, to rent a second ship. The expense and difficulty of cleaning a ship this size is prohibitive."

"Oh. Still, you've done it at least once."

"With this ship? Not true. It was a new craft, water-filled but not yet seeded. We were all fortunate the timing worked out so well."

"Indeed." Carmen nodded. Textured algae foods wouldn't be the ultimate solution to Astra's supply problems, but for the time being they would enable the colony to stretch out its stockpile well into the next growing season. *As soon as the output and delivery system stabilize,* she decided, *we can switch the Rooshrike's ground tanks to normal vegetable production. I wonder if we could support any livestock yet . . . or how we'd get hold of them, for that matter.*

"If you're finished with your inspection," the Pom said, "I believe Waywisher would like to speak with you in private in the control area."

"All right." *Probably wants to discuss rental fees,* she decided, kicking herself toward the hull where the currents would make noseward motion easier. Two of the three Poms fell into formation beside her, the third disappearing somewhere back toward the stern. A half dozen openings led forward from the central room; picking one at random, she swam through it, flicking on her light as the sunlight faded behind her. The "darkroom," as she'd privately dubbed it, was nearly as big as the area they'd just left and just as full of algae. Fortunately, the exit hatch was rimmed with red-orange lights, and she was able to find it without assistance. The lock was big enough for all three of them, a definite plus for visitors who didn't have the sort of manipulative equipment the mechanism had been designed for. After the warmth of the algae tank the clean water flooding in felt like the North Atlantic, and she was glad when the inner door finally opened and she could get her arms and legs moving again.

If the algae tanks had reminded her of an aquarium, the forward part of the ship was nothing less than a 3-D mouse maze lined with Christmas lights and sunk in water. She assumed that the sudden twists and turns in the corridors made some kind of sense, but on the basis of a single visit she couldn't figure out exactly how. *Must have an interesting room layout,* she thought as they negotiated two right-angle turns in less than four meters. *I'd hate to be on a landing party assigned to take this ship.* The thought reminded her of the question Meredith had wanted her to ask while she was here, and she spent the rest of the swim trying to come up with a polite way to phrase it.

They emerged from the maze into a control room whose impressiveness lay less in lights and gadgetry than in the

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quiet competence she could sense in the Poms on duty there. Off to one side, floating next to a porthole, was the alien she recognized as Waywisher. As she turned in his direction he flipped his tail, timing his movement to meet her exactly halfway.

"Good day, Miss Olivero," the translator said as Waywisher swam around her in a brief pattern she took for a Pom welcome dance. Possibly a sign of responsibility as well, she decided, noting that her escort withdrew to the other side of the room as it ended. "I trust the ship has been set up to your satisfaction?"

"It seems to be, so far," she said. "We'll know in a few days or weeks, after the whole system reaches equilibrium. You wished to talk privately with me?"

"Yes." There was a brief hum on the circuit, and when the translator voice began again it had changed subtly in tone. "We are now cut off from communication with either of our species. I would like to offer you a barter: information for credit against Spinneret cable."

"Indeed?" Carmen asked, trying to dislodge the tight knot that had abruptly formed in her stomach. "What sort of information?"

"We have formulated self-consistent hypotheses concerning both the cable material itself and the 'glue,' as you call it, with which it is coated. We will trade this information for a credit of one trillion dollars."

"That's a lot of money," Carmen said. "What makes you think the information is that valuable?"

"It is unlikely your science will be able to provide you with these insights in the foreseeable future. However, once you have been put on the right track, your progress toward understanding and control of the Spinneret will undoubtedly be greatly enhanced."

"What makes you think we don't have control and understanding now?"

"Two of your fellows died during or shortly after the first Rooshrike cable operation. The conclusion is obvious."

Carmen pursed her lips tightly. "All right. Then as long as we're on the subject anyway, some of us would like to know why you want so much cable. It seems to us that, living under water, the possible uses for something this strong would be extremely limited."

If Waywisher was annoyed by the question, neither his manner nor his words showed it. "It's precisely *because* of our habitat that we need the cable so desperately. Tell me, how do you think we launch our ships into space?"

"Why—" she fumbled at the sudden change of subject. "I assume you do like everyone else: build the ships in orbit with material brought up in shuttles."

"No. For us it turns out to be more economical to build them on the planet surface—" *under water*, Carmen's mind edited in—"and then launch them essentially empty, with only the control areas flooded and most of the crew packed into small boxes under artificial hibernation. A skeleton crew then guides the ship to the nearest ringed gas giant planet—or asteroid belt, if the system is fortunate enough to have one—and spends up to a year mining enough ice to fill the ship. Only then can the crew

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be revived and the ship made fully functional."

"Complicated," Carmen murmured.

"And very costly," the Pom said. "One of every twenty-eight who undergo hibernation does not survive the revival procedure."

Carmen swallowed. "You must want very badly to go into space."

"The oceans of our home are wide and unbounded; we have always been a people who swam freely wherever we chose. Should we now be stopped by the surface of a single world?" The Pom's fins rippled restlessly for a moment, and Carmen had the sudden feeling she'd been granted a brief glimpse into the innermost workings of the Pom psyche. *Odd,* she thought, *how the translators tend to mask how really alien we are to each other. I wonder whether that's a strength or a weakness of the whole technique?* An interesting thought; but before she had time to follow it any further, Waywisher had composed himself. "It is for this reason we desire your cable," he said. "With it we will build a device with which we may bring our ships directly to space."

And suddenly Carmen understood. "You're going to build a skyhook, aren't you? Run a Spinneret cable from orbit to the surface and use it like an elevator."

The Pom's tentacles rippled. "You're familiar with such devices? Astonishing!"

"Only the theory," Carmen admitted, dredging her memory for any details she may have squirrelled away. "We worked that out—oh, at least half a century ago, I think. I don't know if we never came up with anything strong enough to build it or if someone found a flaw in the theory or what."

"There are no theoretical flaws, but we've found no material strong enough for our needs. Until now."

"Yes, the cable would be ideal, wouldn't it?" Was that what the Spinners had used it for? "A trillion dollars is still a lot of money, though. For good, *hard* data we might be willing. But I want an overview first, some idea of what exactly we'd be paying for."

"I suppose that's not unreasonable," Waywisher said after a short pause. "Very well. Our first clues came from the Rooshrike heat tests on their first cable. As you know, it becomes superconducting at relatively low temperatures, distributing the applied heat evenly through its mass. What you may *not* know is that at higher temperatures it begins to show an almost black-body radiation spectrum, but with gaps that resemble absorption lines for various metals. At higher temperatures still the lines disappear."

"Yes, the Rooshrike report mentioned all that. There were some lines like those of simple molecules, too — titanium oxide, I think, and one or two others. I didn't know they'd given the data to anyone but us."

"They didn't. But they did their tests in space, and we had a probe nearby."

"Ah." It was becoming increasingly hard for Carmen to maintain her old image of the Poms as gentle, guileless creatures. "They seemed to think it indicated the presence of non-transmuted metals in the cable skin."

"Not true. The strength of the cable indicates it to be a perfectly homogeneous material."

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"Why? A lot of alloys are stronger than their constituent metals."

"True. But alloys cannot be internally bonded by enhanced nuclear force."

Carmen's skin prickled. The Poms' mastery of nuclear forces was supposed to be what had allowed them to develop an underwater technology in the first place, and it was a secret they'd guarded jealously from other races. If *that* was what they were offering . . . "You've done that kind of bonding yourselves?" she asked, as casually as possible.

"Yes." Waywisher's fins and tentacles rippled restlessly, a mute indication of how much this revelation was costing him. "The theory is quite straightforward, though application can be difficult, and under it the 'glue' can also be partially explained as a stepwise-enhanced edge effect. The absorption-like spectrum lines would then be due to weak force-electromagnetic coupling between nuclear fluctuations and the electron shell response. Is all of this translating properly?"

"I think so," Carmen said, the taste of irony in her mouth. All the talk on Astra of protecting the Spinneret's secrets—and here the Poms had been doing precisely the same thing for centuries. "I'm not a scientist, but all the words sound familiar. So why are you bothering to buy *our* cable when you can make your own?"

Waywisher barked, an almost seal-like sound the translator didn't touch. "We've mastered the technique only for the lightest metals; the difficulty, as well as the material's final strength, increases rapidly with atomic weight. If our theory is correct, the Spinneret cable is composed of an entirely new element with weight approximately three hundred seventy times that of hydrogen . . . and its actual tensile strength around ten to the twelfth pounds per square inch."

Which was, Carmen realized with a shiver, a thousand times as strong as the lower limit the Rooshrike had established for it. "I don't *believe* it," she murmured.

"The numbers are accurate to within ten percent."

"No, I didn't mean that—I was just talking to myself." She took a moment to get her brain back on its rails. "You've got the whole thing—theory, numbers, speculations—all written out for us?"

"I have it with me now. It's on a disk compatable with the reader we delivered to Colonel Meredith four days ago."

"All right, then." Carmen nodded. "A trillion dollars in cable for the disk. You still have to supply however many tons of metal that'll come to, I'm afraid."

"That will be acceptable." Waywisher's left tentacle probed into his harness, emerged with a flat package. "I don't suppose I have to warn you that this information is a great secret of the Pom people, and that its contents are not to be given to any other people."

"Of course." Carmen nodded, taking the package gingerly. "The very fact we've got it at all will only be known by a few select people. We, uh, are honored by your trust."

"We have little choice." Waywisher's fins were undulating gently, and Carmen suddenly realized the two of them had begun drifting toward the outer lock and her waiting shuttle. "You have something we need; it isn't trust

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to offer something of equal value in exchange for it. Besides, your military weakness prevents you from the casual betrayal an empire might consider. Should you do so, your destruction would follow quickly."

Carmen swallowed. "And we value your friendship, too," she murmured.

With a flip of his tail Waywisher drove them the last meter to the lock, steadying Carmen with one tentacle as he worked the mechanism with the other. "Good-bye, Miss Olivero. We look forward to a long and harmonious relationship between our peoples."

"As do we," Carmen nodded, kicking backward into the lock. "Good-bye, Waywisher."

Especially, she added to herself as the lock door slid shut, *a* long *one*.

Lieutenant Andrews was looking more than a little worried when she finally emerged from the lock's air dryer into the shuttle passenger bay. "You all right?" he asked, helping her maneuver the weightless but massive oxygen tanks into their jury-rigged latches.

"Sure," she said, exchanging her fins and mask for a pair of soft boots. "Why do you ask? Just because you lose your monitor for a few—"

"So you knew about that, did you?" His eyes probed her face, flicked to the package Waywisher had given her. "It wasn't equipment failure, then, I take it. Waywisher really meant it when he asked for a private chat?"

"Something like that. I'm not at liberty to discuss it with anyone but Colonel Meredith. I'm sorry."

Andrews shrugged. "It's okay by me—secrets I can't tell anyone else just add frustration to my life, anyway. You might as well go back and change, though," he added as she headed for one of the crash chairs. "We're going to be up here for another orbit."

She frowned. "Why?"

He grinned. "Because there's a Ctencri shuttle making its approach now and Major Brown wants it to have lots of room. As befits incoming VIP's."

"VIP's? You mean. . . ?"

"Yep. Perez's little gamble paid off. The scientific cavalry has arrived." ■

CONCLUDED IN NEXT ISSUE

● Our forefathers did without sugar until the 13th Century, without coal fires until the 14th, without buttered bread until the 16th, tea or soup until the 17th, without gas, matches, or electricity until the 19th, without cars, canned or frozen foods until the 20th. Now, what was it you were complaining about?

Reverend Richard Stephens, Vicar
Church in Cheshire, England

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A MEDIEVAL MANAGEMENT REPORT

(The Master of the Works) says that once he paid Roger de Hirton, mason of the fabric, his wages for almost a fortnight, when he was absent all the time and had done no work.[1] The roofing of the church and the stone work suffer injury through lack of care . . .[2] The wardens and the workmen, though they seemed to be capable, often quarrelled, so the work was often delayed and is endangered.[3] The outer . . . "botraces" have for the most part perished for defect of covering.[4] Also W. the carpenter is an old man and cannot work at high levels. It is ordered that (a) young man be employed in his place, and that the old man shall supervise defects.[5]

(The Master of the Masons) says that there are many of the masons who go against his orders,[6] and also workmen who are not capable or fit for their work,[7] and that some are so disobedient that he cannot restrain or punish them properly.[8] Also that timbers, stone, lime, cement and so forth have frequently been made away with, and that there has been much misappropriation of stone from the quarry,[9] and almost nothing fit for work is brought in.[10] For lack of proper care and roofing there is such a quantity of water that lately a lad has almost been drowned;[11] and that these defects arise from the lack of lead roofing. Also he says that he cannot look after the work, workmen and other things as he ought, because he is interfered with by the Mayor,[12] and he cannot view defects because Sir Thomas de Ludham alone has the keys to the door of the fabric.[13] Will. de Wrasal, under-master of the works, says that the chief defect . . . is that the cranes at the west end of the church are rotten and worthless.[14]

—Excerpts from a report on the Management of the Works at York Minster, January 9–12, 1345 A.D. The source is Jean Gimpel's *The Medieval Machine.*

We've come a long way, baby. Haven't we? In the 638 years since these words were written we've eliminated (1) absenteeism, (2) poor maintenance, (3) personality conflicts, (4) defective workmanship. We've learned (5) that inspectors are not just people who can't do a real job anymore. We've learned to (6) manage effectively, (7) train the workforce adequately, and (8) maintain discipline in the workplace.

We no longer have problems with (9) theft of materials, (10) poor quality of materials or (11) industrial accidents. We have no more (12) political interference or (13) management communications foul-ups. And, of course, (14) we provide the workers with only the best equipment.

With all this far behind us, only one question remains: What is there left to do?

—Michael F. Flynn

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the reference library

By Tom Easton

Flight from Neveryon, Samuel R. Delany, Bantam, $2.95, 400 pp.
Sudanna, Sudanna, Brian Herbert, Arbor House, $15.95, ?pp.
Brightness Falls from the Air, James Tiptree, Jr., TOR, $14.95, 378 pp.
Lifeburst, Jack Williamson, Ballantine/Del Rey, $12.95, 272 pp.
The White Pipes, Nancy Kress, Bluejay, $14.95, 256 pp.
Fugitive in Transit, Edward Llewellyn, DAW, $2.95, 302 pp.
Knight Moves, Walter Jon Williams, TOR, $2.95, 317 pp.
The Vizier's Second Daughter, Robert F. Young, DAW, $2.50, 203 pp.
Rebel's Quest, F.M. Busby, Bantam, $2.75, 244 pp.
Owl Time, M.A. Foster, DAW, $2.95, 251 pp.
Assured Survival: Putting the Star Wars Defense in Perspective, Ben Bova, Houghton Mifflin, $15.95, 343 pp.

Let us pretend that I am an innocent naif, newly come to the marvels of SF. I have read one of Heinlein's early books. I have sneaked one of the *Alien Trace* books home under my shirt and read it by flashlight under the bedclothes, much to my prurient delight. I have enjoyed one of David Drake's bloody sagas.

And now my big-city uncle shows up with Samuel R. Delany's latest, **Flight from Neveryon.** "It's great stuff," he says to my mother. "The only really literary sci-fi around. Delany's an *artist!*"

My mother looks at the cover, makes a moue at the many-eyed monster on the back, shakes her head over the manly figure leading an oxcart on the front, and passes it to me. It has her approval, albeit she didn't look too deeply.

So I read it. And, yes, it's art. It says so all over it, with all those symbols, with the statement that Neveryona is

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really a model of America, with the story that is really an essay on fictioneering, with its meandering, unexciting plot, with its . . . WHAT!?

Well! I always did have my doubts about that big-city uncle, and my mother did once warn me not to get too close to him.

You see, *Flight* is about sexuality and homosexuality and attitudes toward them. It is also perhaps the first AIDS novel, whose author—at least in his in-story persona—professes a highly personal interest in the issue. And I hope he will pardon the tongue-in-cheek beginning to my review, on the grounds that I have in fact given my readers a fair sense of the book's impact.

The lack of plot, by the way, is not necessarily a defect. It does distance the book from the rest of SF, and it did make it extraordinarily hard for me to get into the story. But I persevered, and eventually I began to see what Delany was up to, what his story was "about." I then had to deny my first impression of unreadability and agree that, yes, Delany is saying something worth listening to. Unfortunately, that point did not come until halfway through the book. Many readers, even with my recommendation, probably will not last so long.

Flight is not really a novel. It contains two stories and two "appendices." The first of the stories, "The Tale of Fog and Granite," shows us a wandering smuggler obsessed with collecting the myths of the Liberator, Gorgik, and his sidekick Noyeed. As the smuggler wanders, he reminisces, wondering who might or might not be the true Liberator of Neveryona's slaves. He enjoys a sexual encounter of remarkable bizarreness with a man who might or might not be Noyeed. He meets a false Liberator. And finally, a second smuggler, who might or might not be the first (his torn bag bears a different burden), meets the true Gorgik while reflecting on the vagaries of fate and memory. And that's about it, folks. This one is little more than a foggy portrait of a world.

The second tale is "The Mummer's Tale," told by an itinerant actor to an aging lordling who once renounced his title to found a school. As an incidental note, the mummer casts some light on a friend who seems to be the smuggler of the first tale. His point, though, seems more to be to comment on the process of creating fictions, leading up to the section from which I quote:

"(A story) speaks against the other. It speaks always in dialogue with, in contest to, in protest of the real. It is always calling out to the other across the bridge on whose wild span madness and desire endlessly trade places, creating a wilderness at their center as palpably dangerous as that observed at any ill-mapped border. The monologue of art must be reinterpreted as the many-voiced argument of the artist with the life, with life's images—indeed, as the many-voiced wrangle between the articular and everything else, with desire never fully possessed by any party, but endlessly at play between."

"Appendix A: The Tale of Plagues and Carnivals, or: Some Informal Remarks Toward the Modular Calculus, Part Five" is a tale of a very different kind. Here Delany holds dialogue with himself, fiction versus life, as he imposes a plague upon Neveryona to match that of AIDS in the world of his daily paper. To distract the afflicted populace, the government invites the Liberator into its councils. The populace, however, has a different idea: It will summon the Amnewor, a named god of death from before the time of the nameless gods. In counterpoint, the

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lordling from "The Mummer's Tale" recalls his boyhood journey of exploration of his land, and his discovery of the monster—which may be the Amewor—which patrols the borders of the known.

"Appendix B: Closures and Openings" comments upon the whole, upon the rest of the Neveryona series (which this book ends), and upon the idea of a "modular calculus." It struck me as a precious touch which Delany could well have foregone, for I had, I think, his point before I reached this section. The initial ennui had become intrigue and interest, and even some level of involvement, and I was ready to recommend the book to careful, patient readers. If they are fans of Neveryona, so much the better, for they will find interest in Appendix B as well.

Like father, like son? Not quite. Of Brian Herbert's two SF novels, the latest is the barely readable **Sudanna, Sudanna.** It's the tedious, plodding account of the utpeople, who dwell on Ut, the impossibly peanut-shaped moon of a gas giant world. Their "dwellos" float upon Ut's soil, or galoo, which liquefies in summer. Photosynthesizers, they need not work for food, so they devote their lives to following a library full of rules laid down by the U-Lotans, who conquered them 15 million years ago. The rules are enforced by Mamacita, an eyeball-sized computer, and her holographic cops. At the time of the story, Mamacita is breaking down and the utpeople are, bit by bit, beginning to rebel.

And it's about time. To put up with the U-Lotans' absentee rule—they vanished not long after the conquest—the utpeople have to have brains roughly the size and shape of their world's likeness. They are clearly authorial constructs meant only to support a morality play whose moral Herbert reinforces by telling us the U-Lotans conquered almost every world in the galaxy and set up various sociological experiments run by computers such as Mamacita. Earth is one of the few exceptions, perhaps because Earthpeople—pat yourselves on the head, folks—are too smart to put up with the sort of guff the utpeople tolerate so long.

Brian Herbert has a long way to go, not to catch up to his father—he should set his own goals—but to catch up to modern SF. His style is vintage 1930, as you can see in this entirely representative quote:

"At the rooftop control station, Hiley looked at his dwello and realized that it was nicer than most. His handyman's talent helped. The split-level white-and-green home had nine-layer Lotanglas windows for maximum heating and cooling efficiency, a triple-thick hull, eighteen high-efficiency solar cells, a large solar hearth (with a bright plazbrass chimney) and two top-of-the-line galoo launchers—one fore and one aft—for catapulting warm galoo at neighbors and other disliked utpersons."

Granted, Hiley is supposed to be a particularly smug character, but they *all* think that way! I submit that, though it is only the beginning of February as I write this, we have here the turkey of the year.

What a delight it is to turn to **Brightness Falls from the Air,** by that brilliantly warm writer, James Tiptree, Jr., aka Alice, a.k.a. Raccoona Sheldon. Here we have the world of Damiem, home of the winged Dameii, whose bodies exude a substance that can be processed into a marvelously euphoric drug. Unfortunately, the prime exudate

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appears only under emotional stress, especially pain, and most especially the pain of parents watching their children tortured.

Fortunately, the Federation military cleaned out the goons who were exploiting the Dameii. They also set up a small base for two people and a doctor to serve as protectors of the Dameii and hosts for the occasional visiting fireman. As the story opens, a party of such visitors is landing, come to watch the light show that will result when the wave of particulate radiation from a nearby nova strikes the atmosphere. The party includes a squad of pornofilm actors from Gridworld, a young Prince, a crew-woman, a noblewoman and her comatose twin, a disguised alien from the novaed system, seeking revenge on the humans who had done the deed to end a war, and a trio of baddies who plan to incapacitate everyone else and torment Dameii for the sake of the wealth they can gain.

Tiptree deftly portrays her characters and the forces that shape their various goals. She falters slightly only in that her villains are too much symbols of pure evil, and her Dameii are too much symbols of good. The latter symbolism she weakens to excellent effect when she draws a curious threat from the nova that illuminates her story, but the former she leaves intact. The rest of her people she draws more in the round, a little good, a little bad, the whole illumined with a most sympathetic eye.

Tiptree does indulge herself in one stylistic rarity, for she tells her story in the present tense. The effect is to distance the reader from the story, which is presumably why writers are so often warned against using it. But it works very nicely here.

I loved the story. May you also.

* * *

To Jack Williamson, humanity is a fledgling bird about to leave its nest. Its first steps will be onto the twigs and branches of the tree that holds the nest. There it will meet for the first time grown birds, some young, some old, and encounter the hawks that will threaten it for the rest of time. The nest, of course, is Earth. The twigs are the planets and moons of the inner Solar System. The branches are the icy lumps of the Oort Cloud surrounding the System. The other birds are aliens who, from bases in the Cloud, observe the fledgling, and the hawks are bee-like mechanical intelligences, the Seekers, that were designed and built, ages ago, as self-reproducing weapons. Like Saberhagen's Berserkers, they turned on their creators, and now they sport with fleshly life, rooting it out, destroying its vehicles and homes.

Lifeburst is the story of people who have begun to explore the Oort Cloud just as a young Seeker queen reaches the Solar System, intending to establish her hive. Young Quin, born en route to an Oort base, grows to maturity in isolation from the intriguing clans of Earth, yearning for the bright lights of the Web, a net of satellites linked to the planet by potent fibers. His mother leaves him to return. His stepfather nurtures his skills and ambitions. The Seeker queen destroys craft and probes. Earth refuses to believe the reports, even when the ruler's brattish scion has his own brush with disaster.

And the observers in the Cloud debate action. Are Earthlings too brash for rescue? Is revenge an admissible motive? The youngest of the observers, a species modified by evolution to survive in space and driven from their own system by the Seekers, have memories of a weapon that might kill the nascent hive.

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But their elders are firm believers in nonviolence.

Quin finally makes it to Earth. So does the queen, and as she destroys the Web, Quin finds a captive observer and learns of the rumored weapon. The story's resolution is at hand, and no reader doubts what will happen.

As usual, Williamson handles all the threads of his story like a master. His major character—Quin—throbs with life. And the action peaks quite satisfactorily, even if he does rely on an unexpected nobility in the Seeker queen to save his hero.

You'll enjoy it.

Nancy Kress's **The White Pipes** is her latest excellent fantasy. It begins with the invention of a brand new psi power—the heroine can, with the aid of certain drugs, cause a cloud of light to appear between her hands and then transmute to figurines that act out a story. When she reaches a mountain kingdom, but newly emerged from barbarity, hoping to earn food and space for herself and her young son, she encounters Brant, an old lover and her son's unknowing father. She finds her stories going awry under the influence of mysterious others. And, when Brant kidnaps her son and enlists her aid, willy-nilly, she finds herself in the midst of a battle royal. The king's young queen is a devotee of the old religion, which used the skills that survive now only weakly, as storyshaping, to cloud men's minds and tyrannize their lives. She—and Brant—seek the White Pipes, which play a music that awakens deeper powers and bear a design that reveals the drugs those deeper powers require.

Kress's heroine ends by conquering queen, king, pipes, and lover. But the story is not so simple. Kress is also concerned with the nature of love and its reconciliation with submission. Her heroine wishes to live her own life as no one's vassal, and the greater part of the story's conflict comes from the efforts of others to enslave her, tenderly or forcefully. The story is thus far more aptly modern than it might have been, and it may well appeal most to women who feel the pain of their social and psychological bonds.

We might note that, while men too can be storyshapers, Kress focuses on a woman whose hands create life, or its illusion, and who is threatened by both men and women who wish to usurp and corrupt that creative power. We just might, therefore, read into her story a feminist protest against the new technologies of test-tubes babies and genetic engineering. But though that would make the story SF, at least in a backhanded sort of way, it's surely stretching way too far for an interpretation.

Edward Llewellyn's **Fugitive in Transit** concerns a future Earth where a fusion experiment has opened a door into the Transit system of a multi-species alien civilization. The aliens, understandably upset at the flood of human barbarians into one of their terminals, come to Earth. They arrive in Bengal, where Dr. Bose is working virtually single-handed to alleviate the effects of combined famine and plague. They serve as his assistants, are impressed by him, and decide to follow his advice on how to resolve Earth's problems. The result is the UN as a world government, with Bose as the alien liaison specialist, ample energy and food, and the world of Nuerth for emigration. The "outside agitators" are not welcomed, but the chaos they spark soon dies down.

And then an alien honcho approaches Bose. A fugitive has come to Earth. It looks just like a lovely woman, but it

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has long been a trouble-maker and it has as long eluded capture. The alien, Sludic, insists on help, or else. . . .

We meet the fugitive, Thalia, in Greece, where she bewitches a poet by singing a longer fragment of Sappho than any history records, and in the original dialect, no less. She *says* she's just a poor little Earthling who happened to make a fortune diamond prospecting on Nuerth, but there are problems with that story. Who is she? *What* is she?

I won't spoil the story by telling you. I will only say that events led me to guess she might be Athena herself, escaped from Olympus to roam the stars and returned to help humanity gain its freedom too. I was wrong, but Llewellyn had misdirected me deliberately. His own answer is far more reasonable, and as he works up to it with pursuit and action aplenty, he gives the reader honest value.

Unfortunately, *Fugitive* is the last of Llewellyn's books. Edward Llewellyn-Thomas died of a heart attack on July 5, 1984, at home in Toronto, aged 66. Physician, dean, electrical engineer, professor, poet, novelist—he fitted the *Astounding/Analog* mold well. Appropriately, *Analog* published his first short story in the March, 1985 issue.

A while ago, I reviewed Walter Jon Williams's *Ambassador of Progress*. Now we have his **Knight Moves,** which is excellent despite its obvious borrowings from Simak, Zelazny, Uncle Tom Cobley, and all. We see an Earth largely owned by one man, Doran Falkner, thanks to the vast wealth he gained by listening to a weird alien and inventing an interdimensional tap that provided bountiful energy and made interstellar travel possible. By sponsoring research, he also made possible the development of immortality.

As the story starts, a jaded Falkner is busily recreating ancient Greek architecture and cultivating a nascent culture of genengineered centaurs. But then he is invited to lead the effort to turn a rumor of instantaneous teleportation into technological fact. The effort guides the reader from marvel to marvel in a journey illuminated by a centaur who sings Sapphonic lyrics and illuminating the impacts of technological change. In the end, as always, serendipity rules and Falkner accomplishes his mission by making friends of some awesome gameplayers.

Robert F. Young's **The Vizier's Second Daughter** revives the Arabian Nights for pure fun. Mark Billings jaunts back in time to snatch Sheherazade so technicians can make an animated duplicate of her to act out her storytelling for modern audiences. He botches it, though, when he grabs her kid sister instead and blunders beyond the Veil, into the land of the djinni. Fortunately, Dunyzade is an ingenious gamine who knows or can improvise the answer to any threat, and all ends very well indeed.

There's not a serious bone in this one's body. Enjoy.

F. M. Busby's **Rebel's Quest** gives us the rest of Bran Tregare's story, between his escape from Earth's corporate tyranny with his armed ship to his joining with Rissa Kerguelen. We see his piratical career, his string of lovers, his bold ingenuity, his first glimpse of Rissa as a waif who has won a fortune in the lottery that is the sole hope of Earth's Welfared millions, his avoidance of the Hulzein parents he believes abandoned him to brutality, and finally his inescapable marriage to Rissa and to their joint destiny.

The book adds little to the saga.

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Rather, it seems to have been written to fill in the gaps. It is thus mostly for those readers who want to complete their Busby collections. It stands alone as a story, but by itself it is barely noteworthy.

M. A. Foster's **Owl Time** is an experiment. Foster wrote three novelettes, in roughly the styles of Ballard, Bradbury, and Borges, just for the book, and added a fourth, "Entertainment," *à la* Vance, from *New Voices 4* (1981). The result is a volume of very good entertainment that reads very differently from Foster's novels. "The Man who Loved Owls" is a surrealistic tale of incipient rebellion against the dehumanization, or the depoetising, of technology. "Leanne" is a lovely tale of escape from an intolerably overcrowded Earth. The best, "The Conversation," is a dialog between an author and his creation, to considerable effect.

Recommended.

Assured Survival: Putting the Star Wars Defense in Perspective may be the most valuable thing Ben Bova has ever written. It is part of the Star Wars fever that has gripped the nation ever since Reagan opened his mouth to say that it should be possible and we should put some money into the necessary research. It is part of the debate over feasibility and morality and destabilization. It is in the same vein as Pournelle's and Ing's *Mutual Assured Survival,* and as committed to the premise that a Star Wars defense *can* work and should be developed, but it is a much better book. It makes the case for Star Wars much more convincingly, and it is must reading for anyone who is following the current (as I write this) arms talks in which Star Wars is becoming one more "bargaining chip."

Bova takes a scenario approach to show the reader the consequences of nuclear war with and without an orbital missile-destroying umbrella. He is himself thoroughly persuaded of both feasibility and desirability, though he is aware of the technical, political, and economic obstacles, and he communicates his attitude clearly. His own preference seems to be for an international peacekeeping force, which would control the orbital umbrella, and other weapons, and use them to suppress war anywhere on the planet. He envisions and urges an East-West cooperative effort to build the Star Wars defense for *mutual* security.

I like that idea. However, I can also see how our national leaders are unlikely to go for it. They might prefer to develop the hardware and then give or sell it to the Soviets, with simultaneous deployment for equal security. Such a process should be stabilizing, and it could lead to later cooperation.

But even that approach seems impossible. We may be far more likely to see some private corporation—probably not American, but Japanese or French—taking the technology and peddling the defensive gear to any nation that wants protection. The result would be the same, and it might come rather more quickly.

And there's a story, for Bova himself, or for Lee Correy, or for. . . . ■

● More persons, on the whole, are humbugged by believing nothing, than by believing too much.

Phineas T. Barnum

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brass tacks

Dear Stan,

I'm legally blind and get *Analog* on flexible disks through the Braille Institute Library, 741 N. Vermont Ave., Los Angeles, CA, 90029.

The magazine is mailed directly from EVA, P.O. Box 22700, Tampa, FL, 33630; and it's provided free by the National Library Service for the Blind and Physically Handicapped through the Library of Congress.

I thought that some of your readers might know of a blind or handicapped person who is unaware of the vast reading opportunities provided by this service throughout the country. All that's necessary is that they contact the person in charge of the handicapped section of the main branch of their local library to sign up for a free subscription.

The index in the January issue was a big help because it's hard to distinguish the difference between a long short story and a short novelette, solely by listening.

A team of narrators reads each issue, and they all do a first class job. My thanks go to you, the narrators, and Davis Publications for my chance to hear the stories and to vote for my choices.

LARRY RODIN

Gardena, CA

To Whom it May Concern:

I had been wavering whether or not to renew my subscription; and then the special mid-December *Analog*, edited by Kelvin Throop, arrived. I renewed for 3 years. If even once in that time you have another similar issue it will be worth it.

KATHRYN N. BLACK, PH.D.

West Lafayette, IN

Dear Stanley Schmidt:

When I picked up the "Mid-Decem-

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ber'' issue of Analog, I saw, with disappointment, ''Special spoof issue''. A quick glance through the index confirmed my worst suspicions.

I didn't subscribe to Analog to be spoofed. If I wanted that, I would subscribe to Mad, or maybe National Enquirer. I quickly laid the magazine aside to read something worthwhile.

I always like the Science Fact article the best. Surely it isn't necessary to turn it into a spoof also. Let's hope things will be back to normal next issue. The 16 extra pages are just a waste of paper if filled with such stuff. I was also astonished to receive a ''Mid December'' issue Nov. 1st.

ROBERT D. SMITH

Swisher, IA

And I thought I *was a curmudgeon!*

I'm sorry you don't like the idea of a spoof issue, but might I gently suggest that you can't really judge it by reading the index? If you read the stories and features rather than just their names, I think you'd find that there's very little in that issue that couldn't be in a normal issue of Analog, *and nothing that would fit in those other periodicals.*

I'm not sure why the notion of combining humor with scientific speculation bothers you so much, but I hope you'll give some thought to a line from the play Inherit the Wind: *''When you lose the power to laugh, you lose the power to think straight.''*

KELVIN THROOP

Dr. Schmidt—

In my list of choices for the Anlab, I am including the serials just for the heck of it. They were both excellent, but Larry Niven wins out in my book.

I was quite pleased with your choice of stories this year, and enjoyed the Mid-December spoof issue.

HOWEVER, I was highly offended by ''Love in Bloom'' by Laurence M. Janifer. First of all, I was annoyed that the supposed ''surprise revelation'' in this story was the idea to hire only men. I'd thought of that solution before I'd finished the first page.

The truly offensive part, though, was the supposedly great idea of stopping a war by providing an incentive (perhaps even a need) for mass rape. Is the repeated forceible rape of every available woman and post-pubescent girl really preferable to war? Is a war between the sexes better than a war between governments? Even if the author believes the answer to these questions is yes, I'm outraged that he didn't think it was necessary to raise these important questions.

If the selection of stories for *Analog* had not been of such high quality in the past, I would have canceled my subscription immediately. I have faith in your ability to learn from your mistakes, and trust you will think twice in the future before printing a story which is so blatantly sexist.

SUE SINGER

Sorry that one offended you, but I think you're taking it too seriously. It was actually nothing more or less than a spoof on the works of Robert A. Heinlein, a writer for whom many of us have the greatest respect (and who is fortunately known to have a good sense of humor). The story grew directly out of its opening line, a pun on the opening line of a well-known Heinlein story—and given that opening, it would have been hard to concoct a plot without at least some of the qualities that bothered you. You will note, if you read carefully, that not one rape actually occurred in the story—you were implicitly asked to accept the premise that the affected men's excessive amorousness never became more than a chronic nuisance, like flies.

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That premise is so blatantly contrary to the way real people would act that it should at once label the story as "farce," to be enjoyed as such and nothing more. It no more advocates or condones real rape than Arsenic and Old Lace *advocates or condones real murder.*

Dear Mr. Schmidt,

I was ASTOUNDED and AMAZED (not to mentioned ASTONISHED) when I read *Analog*'s 1984 Special Spoof Issue story "Hindsight" by Eric G. Iverson. This well-structured, detailed, and engaging story was speculative, but the locale was not. Imagine my surprise to find the town where I grew up used as a setting in a story that will be read by many who have never heard of Gardena or the South Bay area.

Because of the nature of this *Analog* issue, many readers may think that Gardena and its environs are make-believe; I'd like to assure them the places did (and still do) exist. I wonder . . . could you let your readers know that the locales and landmarks used in "Hindsight," such as the poker clubs, the post office and, yes, even Giuliano's, are not fiction?

I wonder, too, if you could mention how Mr. Iverson obtained such detailed knowledge of the Gardena area. Is he, perhaps, a home town boy who made good, or simply a guy from the 80s who took a quick jaunt to the 50s and found Gardena a great place to set a tale?

NORMAN JACOBSON,
formerly of Gardena, CA,
now of Mission Viejo, CA

Why, obviously the latter—our writers don't fool around when it comes to doing on-location research!

Dear Dr. Schmidt;

G. Harry Stine, in his article "State of the Art: Science Fiction is Still Too Conservative!" seems to be asserting that *all* science fiction *must* identify and attempt to solve potential and real scientific, technological, and sociological problems of the present and future.

I have always found most stories of this type to be dull and lifeless, mere treatises rather than true stories. I do agree that it *is* a valid *form* of science fiction, and I *do* find these stories entertaining on occasion (Michael P. Kube-McDowell's "Lifebomb" in the same issue, for instance). More often, these stories wander around the idea and its ramifications without much aim or purpose, without an intriguing plot or compelling characters (such as Joseph H. Delaney's "Painkillers", though the idea itself *was* interesting).

This problem may be rooted in the origins of the words "science fiction." The man who invented the word (I gather) intended this category of fiction to be solely for popularizing and explaining science, rather than solely for its entertainment value. I do not advocate changing the name of the category (I rather like the phrase), but I feel it includes more than plotless techno-sociological outlines.

No story should put its value as prophecy and forecast above its entertainment value. A cleverly-done outline of problem and solution *can* be entertaining, but is no real substitute for plot, character, and all the things that make up a good story. Science in science fiction is all right, but there are limits.

ROBERT NOWALL
Cape Coral, FL

I haven't heard anybody lately advocate "mere treatises rather than true stories," and in fact it's awfully hard to get away with that in today's market unless your idea is awfully *interesting. Good thinking about speculative problems is by no means incompatible with*

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entertainment, plot, or character development; really good writers manage to integrate all those things. Harry's complaint—and mine—is that there are too many writers calling themselves "science fiction" writers who are trying to get by on plot, character, and style alone *with little or no attention to the scientific background. They're certainly free to do that, but for* Analog *we're looking for more.*

Dear Stan:

I'm not going to waste an "Alternate View" column responding to those who wrote to comment on "The Military Ratio" (December 1984 issue). It won't take that much to handle the comments.

Nearly every respondent utilized the current technique to attack any scientific and technical paper with which one does not agree for ideological or philosophical reasons: Question the author's data sources. This impugns the veracity and respectability of the author without attacking the author directly. I re-checked my numbers. (I'd checked them when I got the galley proofs before the column was published.) I made no errors in transferring the numbers from my sources, and you made no errors in transferring the numbers to the publication. I stand by the data. Period. If other people want to use other sources, that's okay with me. In the column, I was not trying to prove a point. I was not advocating any philosophical viewpoint or ideology. Although I engaged in some bull-session type speculation, I deliberately drew no conclusions and formed no hypotheses that required testing. I merely pointed out, "Hey, here's some interesting data. It may be totally trivial. I don't know what it means (if it means anything at all), but it might be fun to kick it around." Unbeknownst to anyone (although you probably suspected it), I baited the readers! As we've discussed many times, people read into something only what they want to read or believe. There's an enormous communications gap in spite of the incredible redundancy of the English language. I pricked some people with a very dull point and drew blood. But they'll never admit that they were even molested at all.

As I've warned readers many times, the purpose of my "Alternate View" columns is to inspire thinking beyond the current shibboleths. When you get right down to it, I'm doing the same thing as you are with your editorials: Carrying on the grand tradition of John W. Campbell and his crusade to unstuff stuffed shirts and get people to realize that thinking can be fun and isn't necessarily hazardous to good health and happiness.

Ad mensa per aspera!

G. HARRY STINE

Actually, at least one error did creep in somewhere along the line—in Table II, the data for Japan is clearly inconsistent (the ratio is right but the raw data is that for Libya). We do try to be careful about such things, and readers have every right to expect accuracy in data from which conclusions are drawn. However, as you say, this column didn't set out to do anything that rigorous. ■

● Ever notice that pilots who fly skydivers like to be paid in advance?

Kelvin Throop

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a calendar of analog upcoming events

23-25 August
BUBONICON 17 (New Mexico SF conference) at Shalako Motor Inn, Albuquerque, N. Mex. Guest of Honor—Fred Saberhagen, TM—Gordon Garb. Registration—$12.50 in advance, $15 at the door. Info: New Mexico SF Conference, Box 37257, Albuquerque NM 87176.

30 August-2 September
NASFiC 1985 (North American SF Convention, officially The First Occasional Lone Star SF Convention & Chili Cook-off) at the Hyatt Regency Austin and Palmer Auditorium, Austin, Texas. Guest of Honor—Jack Vance, Artist Guest of Honor—Richard Powers, Fan Guest of Honor—Joanne Burger, TM—Chad Oliver. Registration—attending $45 in advance, more at the door; supporting—$15. Info: NASFiC, Box 9612, Austin TX 78766.

30 August-2 September
MORE EASTLY CON (Media SF conference) At Sheraton Inn LaGuardia Airport, Queens, N.Y. Dealers, art show, films, video. Registration—$26 (plus 1 $0.37 S.A.S.E.) until 7 August 1985; more at the door. Info: Devra Langsam, 627 East 8th Street, Brooklyn NY 11218 (include S.A.S.E.)

6-8 September
COPPERCON (Arizona relaxacon) at Safari Resort Hotel, Phoenix, Ariz. Guest of Honor—Nancy Springer, Fan Guest of Honor—Keith Williams. Info: Coppercon, Box 11743, Phoenix AZ 85061.

6-8 September
UP-OVER CON (Wisconsin relaxacon) at airport Midway Motor Lodge, Milwaukee, Wisc. Info: X-con Ltd., Box 7, Milwaukee WI 53201.

13-15 September
CAMCON/UNICON 6 (University SF conference) at New Hall College, Cambridge, England. The usual plus NO disco. Registration—L4 supporting, L7 attending. Info: Camcon, C/o Neil Taylor, Perspective Design Ltd., Top Floor, 9 Pembroke Street, Cambridge CB 2 3QY, England UK.

20-22 September
MOSCON VII (Idaho SF conference) at Cavanaugh's Motor Inn, Moscow, Idaho. Guest of Honor—John Varley, Artist Guest of Honor—Rick Sternbach, Fan Guest of Honor—Richard Wright. Registration—$16 until 1 September, $18 thereafter. Info: MosCon VII, Box 8521, Moscow ID 83843.

21-22 September
VALLEY CON 10 (North Dakota sf conference) at the Holiday Inn, Fargo, N.D. Guest of Honor—Patricia Wrede. The usual plus tarot reading. Registration—$4 in advance, $5 at the door (under 13-$3). Info: Valley Con 10, Box 7202, Fargo ND 58111. (include S.A.S.E.)

23-25 September
Space Tech 85 (IEEE, ASME, SME, et al.) at Anaheim, Calif. Info: Gregg Balko, SME, Technical Activities Dept., 1 SME Drive, Box 930, Dearborn MI 48121. (313) 271-1500 x368.

28 August-1 September 1986
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw Registration—$25 supporting; $45 until 1 August 1985. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConFederation, 2500 North Atlanta Street #1986, Smyrna GA 30080. (404) 438-3943.

—Anthony Lewis

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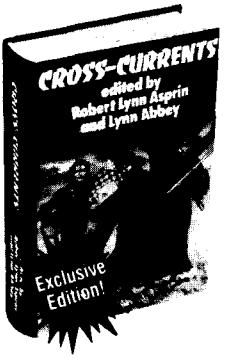

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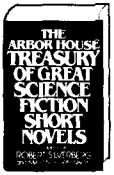

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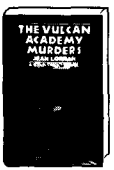

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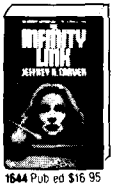

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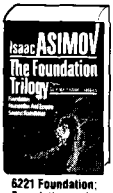

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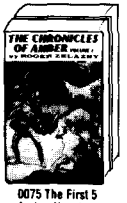

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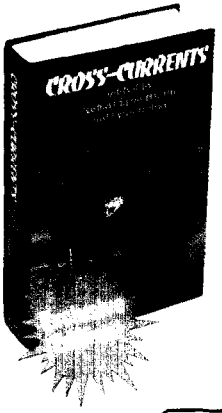

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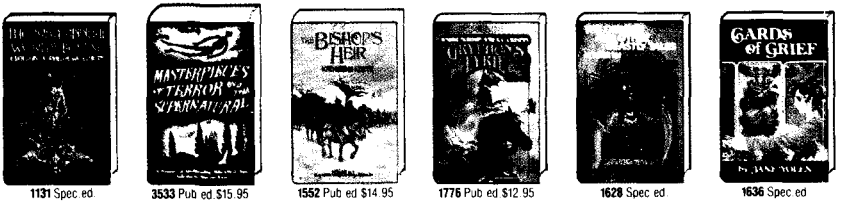

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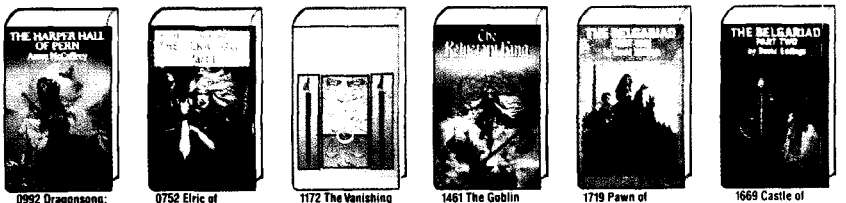

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